RCA TUBE HANDBOOK HB-3

TRANSMITTING TUBE SECTION

This section contains data for certain RCA tubes employed in broadcast, television, and communication transmitters, electronic heaters, and other types of electronic equipment requiring tubes capable of handling appreciable power.

For further Technical Information, write to Commercial Engineering, Tube Department, Radio Corporation of America, Harrison, N. J.

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TRANSMITTING TUBES

PRICES□
OF TRANSMITTING TUBE TYPES

Type	Schedule D●	Schedule U▲
2E24	4.65	-
2E26	3.85	-
3B25	-	$ 6.90
3B28	-	8.55
3C33	-	21.25
3E22	-	8.30
3E29	-	20.25
4-65A	-	20.00
4-125A/4D21	-	30.25
4-250A/5D22	-	41.25
4C33	-	182.75
4E27/8001	-	24.50
4E27A/5-125B	-	35.75
4X150A	-	48.00
4X500A	-	121.00
7C24	-	169.00
8D21	-	1300.00
9C21	-	922.00
9C22♣	-	1300.00 1200.00*
9C25	-	1080.00 980.00*
10-Y♣	3.90	-
203-A♣	-	13.75
204-A♣	-	130.00
207♣	-	240.00
211♣	-	13.75
217-C♣	-	21.17
575-A	-	21.00
673	-	21.00
715-C	-	63.00
800♣	-	11.50
801-A♣†	-	4.85
802	-	4.75
803♣	-	24.25
804♣	-	17.50
805	-	13.50
806	-	34.25
807	-	2.50
808	-	10.75
809	-	4.00
810	-	16.25
811-A	-	5.00
812-A	-	5.00
813	-	18.00
814	-	14.25
815	-	8.20
816	-	$ 1.65
826	-	12.50
827-R	-	172.50
828	-	13.75
829-B	-	16.25
830-B♣	-	11.50
832-A	-	12.90
833-A	-	49.50
834	-	14.50
835♣	-	19.50
836	-	9.00
837	-	5.80
838♣	-	13.75
841♣	-	4.35
842♣	-	4.05
843♣	-	2.60
845	-	13.75
846♣	-	250.00
849♣	-	138.00
851♣	-	340.00
857-B	-	218.50
860♣	-	34.50
861♣	-	178.25
862-A♣	-	1322.00 1287.00*
865♣	-	11.50
866-A†	-	2.10
869-B	-	138.00
872-A†	-	8.20
880	-	540.00
889-A	-	210.50
889R-A	-	295.00 275.00°
891	-	237.00
891-R	-	385.00 355.00*
892	-	237.00
892-R	-	385.00 355.00*
893-A♣	-	664.00
893A-R♣	-	1212.00 1062.00*
898-A♣	-	1322.00 1287.00*
1608♣	-	7.90
1610♣	-	2.50
1613	-	2.45
1614	-	2.00

(continued on next page)

PRICES
OF TRANSMITTING TUBE TYPES

Type	Schedule D●	Schedule U▲	Type	Schedule D●	Schedule U▲
1616.....	-	$ 8.65	5770.....	-	$ 995.00
1619♣.....	-	2.50	5771.....	-	543.00
1623♣.....	-	4.05	5786.....	-	78.00
1624♣.....	-	4.00	5831.....	-	■
1625.....	-	2.65	5946.....	-	115.00
1626♣.....	-	1.85	6146.....	4.90	-
5556.....	-	13.50	6159.....	4.90	-
5558.....	-	15.50	6161.....	-	115.00
5561.....	-	40.00	6166.....	-	780.00
5588.....	-	120.00	6181.....	-	750.00
5592.....	-	{1229.00 {1159.00*	8000.....	-	14.50
			8003.....	-	14.00
5618.....	-	3.60	8005.....	-	8.40
5671.....	-	{1250.00 {1150.00*	8008.....	-	8.20
			8012-A♣.....	-	15.50
5713.....	-	176.00	8014-A.....	-	●
5762.....	-	169.00	8025-A.....	-	11.30
5763.....	-	1.75			

□ This price list applies only in the United States of America and is subject to change without notice. The price includes Federal Excise Tax, where applicable. All prices are exclusive of any state and local excise, sales and similar taxes.

● Schedule D shows list prices for tube types priced for distribution through dealer and service channels.

▲ Schedule U shows user prices for tube types priced for distribution through other than dealer and service channels.

* This price applies when a new tube is purchased and a radiator and crate in acceptable condition are returned prepaid to address shown on Return Authorization.

♣ Not recommended for new equipment design.

† For data refer to corresponding types designated 801-A/801; 866-A/866 and 872-A/872, respectively.

★ This price applies when a new tube is purchased and a worn-out tube and shipping container are returned prepaid to address shown on Return Authorization.

○ This price applies when a new tube is purchased and a radiator in acceptable condition is returned prepaid to address shown on Return Authorization.

■ Price on request.

● Discontinued type. Data sheet has been retained in book for reference purpose only.

INFORMATION ON PURCHASING ABOVE TYPES

Information as to where *RCA transmitting tubes* can be purchased may be obtained from our *regional office* nearest you or from *Tube Department, Radio Corporation of America, Harrison, N.J.*

TRANSMITTING TUBE GUIDE

FOR EQUIPMENT DESIGN ENGINEERS

When choosing tube types, the equipment designer should refer to the RCA PREFERRED TYPES LIST and its companion list—TYPES NOT RECOMMENDED for NEW EQUIPMENT DESIGN—both of which appear in the General Section.

NOTE: The Max. Ratings shown in this Guide are given for Continuous Commercial Service, unless otherwise noted. Tube types marked with • may also be operated in Intermittent Commercial and Amateur Service at higher ratings as shown on their data pages.

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	TYPE
CLASS A AMPLIFIERS, AF				
(1) Triodes				
7.5	350	7.5	4.5	5556
20	600	20	7.5	801-A
28	400	25	6.3	•807°,••
75	1250	75	10.0	211
100	1250	100	10.0	845
150	1250	100	10.0	845••
(2) Tetrodes				
149	3000	65	6.3	4-65A••
290	3000	125	5.0	4-125A/4D21••
625	4000	250	5.0	4-250A/5D22••
(3) Pentodes				
5.0	300	5	6.0	5618••
5.1	300	5	3.0	5618••
15	500	15	6.3	•802
(4) Beam Power Tubes				
10	300	10	6.3	2E24
10.5	300	10	6.3	2E26
35	400	20	6.3	•6146° ••
35	400	20	12.6	•6159° ••
40	375	21	6.3	•1614••
60	600	20	6.3	•6146••
60	600	20	12.6	•6159••
75	2000	75	5.0	4E27/8001
100	600	30	6.3	829-B□ •• *
100	600	30	12.6	829-B□ •• *
225	1750	70	10.0	•828••
CLASS B AMPLIFIERS, AF				
(1) Triodes				
42	600	20	7.5	801-A
75	750	25	6.3	•809, •1623
85	1250	35	7.5	800
150	1000	60	10.0	830-B
150	1500	50	7.5	•808
165	1250	45	6.3	•811-A, •812-A
220	1250	100	10.0	203-A, 211
225	1250	75	10.0	•8005
315	1500	125	10.0	805
330	1350	100	10.0	8003
425	2500	125	10.0	•810, •8000
500	3000	150	5.0	•806

•• Class AB_1 operation. * Natural cooling.

° With triode connection. □ Push-Pull Type. •• ICAS Ratings only.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TRANSMITTING TUBE GUIDE

FOR EQUIPMENT DESIGN ENGINEERS

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	TYPE
CLASS B AMPLIFIERS, AF—(Continued)				
(1) Triodes—(Continued)				
600	3000	250	11.0	204-A
1125	3000	300	10.0	•833-A*
1200	3000	600	11.0	5786
1600	4000	400	10.0	•833-A**
5500	5000	2000	12.6	7C24
8700	6200	3000	12.6	5762
10500	10000	3500	☆	891-R
12000	8500	5000	11.0	889-A
12000	8500	5000	11.0	889R-A
12000	12500	4000	☆	892-R
20000	15000	5000	☆	891
20000	15000	7500	22.0	207
20000	15000	7500	☆	892
40000	10500	15000	12.6	880
40000	11500	17500	6.0	9C25
45000	12500	22500	7.5	5771
60000	15000	20000	19.5	9C22
90000	15000	40000	19.5	9C21
90000	15000	25000	11.0	5671
90000	15000	50000	11.0	5770
(2) Super-Power Beam Triode				
300000	10500	135000	6.0	5831
(3) Tetrodes				
198	3000	65	6.3	4-65A§
390	3000	125	5.0	4-125A/4D21§
710	4000	250	5.0	4-250A/5D22§
(4) Pentodes				
325	4000	125	5.0	4E27A/5-125B§
(5) Beam Power Tubes				
30	400	10	6.3	2E24§
30	400	10	6.3	2E26§
54	600	25	2.5	1624§
60	400	20	6.3	•815□, §
60	400	20	12.6	•815□, §
60	600	25	6.3	•807§
60	600	25	12.6	•1625§
62.5	600	20	6.3	•6146§
62.5	600	20	12.6	•6159§
360	2250	100	10.0	•813§

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
CLASS B AMPLIFIERS, RF Telephony					
(1) Triodes					
14	350	10	4.5	6	5556
30	600	20	7.5	60	801-A
37.5	750	25	6.3	60	•809, •1623
50	1250	35	7.5	60	800

• See NOTE on first page of this GUIDE. ☆ See data pages for this type.
■ For rated max. plate input and voltage. * Natural cooling.
□ Push-Pull Type. § Class AB_2 operation. ** Forced-air cooling.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TRANSMITTING TUBE GUIDE

FOR EQUIPMENT DESIGN ENGINEERS

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
CLASS B AMPLIFIERS, RF Telephony—(Continued)					
75	1250	50	7.5	100	834
90	1000	60	10.0	15	830-B
110	1250	75	10.0	60	•8005
150	1250	100	10.0	15	203-A, 211
150	1350	100	10.0	30	8003
185	1500	125	10.0	30	805
185	2000	125	10.0	30	•810
190	2000	125	10.0	30	•8000
225	3000	150	5.0	30	•806
400	2500	250	11.0	3	204-A
450	3000	300	10.0	30	•833-A*
600	4000	400	10.0	20	•833-A**
3300	5000	2000	12.6	110	7C24
6000	12500	4000	☆	1.6	892-R
7500	8500	5000	11.0	50	889-A
7500	8500	5000	11.0	40	889R-A
15000	15000	10000	22.0	1.6	207
15000	15000	10000	☆	1.6	892
26000	11500	17500	6.0	30	9C25
32000	10500	20000	12.6	25	880
33000	12500	22500	7.5	25	5771
(2) Tetrodes					
1200	3500	800	7.5	110	827-R
(3) Pentodes					
15	500	10	6.3	30	•802
60	1250	40	7.5	15	•804
180	2000	125	10.0	20	803
(4) Beam Power Tubes					
30	400	20	6.3	125	•815□
30	400	20	12.6	125	•815□
37.5	600	25	6.3	60	•807
37.5	600	25	12.6	60	•1625
75	1250	50	10.0	30	•814
105	1250	70	10.0	30	•828
150	2000	100	10.0	30	•813
CLASS B AMPLIFIERS, Television Service					
(1) Triodes					
560	1600	250	6.3	900	6161
6500	3700	3000	12.6	216	5762
(2) Tetrodes					
3500	2000	2000	12.0	900	6181
22000	6000	10000	5.0	216	6166
CLASS C AMPLIFIERS, RF Telephony					
(1) Triodes, Plate Modulated					
14	350	7	4.5	6	5556
17.5	350	10	7.5	8	10-Y
23	325	14	6.3	80	•1614°
30	500	13.5	7.5	60	801-A

• See NOTE on first page of this GUIDE.
■ For rated max. plate input and voltage.
□ Push-Pull Type. ☆ See data pages for this type.
* Natural cooling.
** Forced-air cooling.
° With triode connection.

TRANSMITTING TUBE GUIDE

FOR EQUIPMENT DESIGN ENGINEERS

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
CLASS C AMPLIFIERS, RF Telephony—(Continued)					
(1) Triodes, Plate Modulated—(Continued)					
50	600	17.5	6.3	60	•809, •1623
50	800	27	6.3	500	•8025-A**
60	800	30	7.5	250	•826*
75	800	40	7.5	250	•826**
80	800	40	10.0	15	830-B
80	1000	23	7.5	60	800
100	1000	35	7.5	100	834
115	1000	30	6.3	30	•811-A,•812-A
135	1250	35	7.5	30	•808
160	1000	50	10.0	60	•8005
170	800	130	6.3	1200	5588
175	1000	67	10.0	15	203-A, 211
220	1100	67	10.0	30	8003
220	1250	85	10.0	30	805
270	1300	167	6.3	900	6161
335	1600	85	10.0	30	•810, •8000
500	2500	110	5.0	30	•806
550	2000	167	11.0	3	204-A
835	2500	200	10.0	30	833-A*
1000	2500	400	11.0	160	5786
1250	3000	270	10.0	20	•833-A**
3750	4000	1300	12.6	110	7C24
5000	5000	2000	12.6	30	5762
6000	6000	3000	11.0	50	889-A
6000	6000	3000	11.0	40	889R-A
10000	10000	2500	☆	1.6	892-R
10000	10000	6600	22.0	1.6	207
10000	10000	6600	☆	1.6	892
26000	9000	11500	6.0	30	9C25
36000	10500	12000	12.6	25	880
40000	10000	15000	7.5	25	5771
50000	12500	14000	19.5	5	9C22
50000	12500	28000	19.5	15	9C21
55000	12500	17000	11.0	10	5671
60000	12500	33000	11.0	20	5770
(2) Super-Power Beam Triode, Plate Modulated					
250000	10500	135000	6.0	☆	5831
(3) Triodes, Grid Modulated					
60	1000	40	6.3	500	•8025-A**
190	2000	125	10.0	30	•8000
(4) Tetrodes, Plate Modulated					
16	400	6.7	6.3	30	•802‡
20	400	8	12.6	20	837‡
80	1000	27	7.5	15	•804‡
250	1600	85	10.0	20	803‡
270	2500	45	6.3	50	4-65A
380	2500	85	5.0	120	4-125A/4D21
675	3200	165	5.0	75	4-250A/5D22
1200	3000	550	7.5	110	827-R
1650	1600	1300	12.0	900	6181
10000	5000	6600	5.0	30	6166
(5) Tetrodes, Grid Modulated					
1200	3500	800	7.5	110	827-R

• See NOTE on first page of this GUIDE.
■ For rated max. plate input and voltage.
☆ See data pages for this type.
** Forced-air cooling.
‡ With tetrode connection.
* Natural cooling.

TRANSMITTING TUBE GUIDE

FOR EQUIPMENT DESIGN ENGINEERS

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
CLASS C AMPLIFIERS, RF Telephony—(Continued)					
(6) Pentodes, Plate Modulated					
11.5	275	7	6.3	45	1613
16	400	6.7	6.3	30	•802
20	400	8	12.6	20	837
80	1000	27	7.5	15	•804
250	1600	85	10.0	20	803
380	3200	85	5.0	75	4E27A/5-125B
(7) Pentodes, Grid Modulated					
15	500	10	6.3	30	•802
16	500	12	12.6	20	837
60	1250	40	7.5	15	•804
180	2000	125	10.0	20	803
(8) Beam Power Tubes, Grid Modulated					
30	400	20	6.3	125	•815□
30	400	20	12.6	125	•815□
37.5	600	25	2.5	60	1624
75	1250	50	10.0	30	•814
105	1250	70	10.0	30	•828
150	2000	100	10.0	30	•813
(9) Beam Power Tubes, Plate Modulated					
20	400	6.7	6.3	125	•2E24
20	400	6.7	6.3	125	•2E26
22	600	10	6.3	200	•832-A□
22	600	10	12.6	200	•832-A□
23	325	14	6.3	80	•1614
37.5	500	16.5	2.5	60	1624
40	325	13.5	6.3	125	•815□
40	325	13.5	12.6	125	•815□
40	475	16.5	6.3	60	•807
40	475	16.5	12.6	60	•1625
45	480	13.3	6.3	60	•6146
45	480	13.3	12.6	60	•6159
67.5	600	21	6.3	200	•829-B□,*
67.5	600	21	12.6	200	•829-B□,*
90	560	30	6.3	15	⊡3E22□
90	560	30	12.6	15	⊡3E22□
90	600	28	6.3	200	•829-B□,**
90	600	28	12.6	200	•829-B□,**
120	1000	34	10.0	30	•814
135	1000	47	10.0	30	•828
240	1600	67	10.0	30	•813
250	3000	65	5.0	75	4E27/8001
(10) Beam Power Tubes, Suppressor Modulated					
110	2000	75	5.0	75	4E27/8001

• See NOTE on first page of this GUIDE.
■ For rated max. plate input and voltage.
⊡ IMS Ratings only—see data pages for this type.
* Natural cooling.
** Forced-air cooling.
□ Push-Pull Type.

TRANSMITTING TUBE GUIDE

FOR EQUIPMENT DESIGN ENGINEERS

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
CLASS C AMPLIFIERS, Television Service					
(1) Triodes, Bias Modulated					
560	1600	250	6.3	900	6161
6500	3700	3000	12.6	216	5762
(2) Tetrodes, Bias Modulated					
3500	2000	2000	12.0	900	6181
10000	6000	6000	3.2	300	8D21□
22000	6000	10000	5.0	216	6166
CLASS C AMPLIFIERS, RF Telegraphy					
(1) Triodes					
6.25	250	5	12.6	30	1626
14	350	10	4.5	6	5556
27	450	15	7.5	8	10-Y
42	600	20	7.5	60	801-A
75	750	25	6.3	60	•809, •1623
75	1000	40	6.3	500	•8025-A••
95	1000	45	7.5	250	•826•
100	1250	35	7.5	60	800
125	1000	60	7.5	250	•826••
125	1250	50	7.5	100	834
150	1000	60	10.0	15	830-B
175	1250	45	6.3	30	•811-A,•812-A
200	1500	50	7.5	30	•808
220	1250	100	10.0	15	203-A, 211
240	1250	75	10.0	60	•8005
250	1000	200	6.3	1200	5588
315	1500	125	10.0	30	805
330	1350	100	10.0	30	8003
400	1600	250	6.3	900	6161
450	1500	250	3.3	220	5713
500	2000	125	10.0	30	•810, •8000
600	3000	150	5.0	30	•806
690	2500	250	11.0	3	204-A
1250	3000	300	10.0	30	833-A•
1500	3000	600	11.0	160	5786
1800	4000	400	10.0	20	•833-A••
5500	5000	2000	12.6	110	7C24
8700	6200	3000	12.6	30	5762
15000	10000	4000	☆	1.6	891-R
16000	8500	5000	11.0	40	889R-A
16000	8500	5000	11.0	50	889-A
18000	12000	6000	☆	1.6	891
18000	12500	4000	☆	1.6	892-R
30000	15000	10000	22.0	1.6	207
30000	15000	10000	☆	1.6	892
40000	11500	17500	6.0	30	9C25
50000	11500	17500	11.0	50	5592
60000 / 67500	10500 / 15000	20000	12.6	25 / 1.5	880
60000 / 67500	12500 / 15000	22500	7.5	25 / 1.6	5771

• See NOTE on first page of this GUIDE.
■ For rated max. plate input and voltage.
□ Push-Pull Type.
• Natural cooling.
☆ See data pages for this type.
•• Forced-air cooling.

TRANSMITTING TUBE GUIDE

FOR EQUIPMENT DESIGN ENGINEERS

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
CLASS C AMPLIFIERS, RF Telegraphy—(Continued)					
(1) Triodes—(Continued)					
100000	17000	20000	19.5	5	9C22
100000	15000	25000	11.0	10	5671
150000	17000	40000	19.5	15	9C21
150000	17000	50000	11.0	20	5770
(2) Super-Power Beam Triode					
650000	16000	150000	6.0	☆	5831
(3) Tetrodes					
25	500	10	6.3	30	•802‡
32	500	12	12.6	20	837‡
120	1250	40	7.5	15	•804‡
250	1250	150	6.0	500	4X150A
345	3000	65	6.3	50	4-65A
350	2000	125	10.0	20	803‡
500	3000	125	5.0	120	4-125A/4D21
1250	4000	250	5.0	75	4-250A/5D22
1500	3500	800	7.5	110	827-R
1800	4000	500	5.0	120	4X500A
2500	2000	2000	120.0	900	6181
10000	6000	6000	3.2	300	8D21□
18000	6600	10000	5.0	30	6166
(4) Pentodes					
7.5	300	5	6.3	100	5618••
7.5	300	5	3.0	100	5618••
17.5	350	10	6.3	45	1613
25	500	10	6.3	30	•802
32	500	12	12.6	20	837
120	1250	40	7.5	15	•804
350	2000	125	10.0	20	803
500	3000	125	5.0	75	4E27A/5-125B
(5) Beam Power Tubes					
15	300	12	6.0	175	5763
30	500	10	6.3	125	2E24
30	500	10	6.3	125	•2E26
35	375	21	6.3	80	•1614
36	750	15	6.3	200	•832-A□
36	750	15	12.6	200	•832-A□
54	600	25	2.5	60	1624
60	400	20	6.3	125	•815□
60	400	20	12.6	125	•815□
60	600	25	6.3	60	•807
60	600	25	12.6	60	•1625
67.5	600	20	6.3	60	•6146

• See NOTE on first page of this GUIDE.
■ For rated max. plate input and voltage.
☆ See data pages for this type.
•• ICAS Ratings only.
‡ With tetrode connection.
□ Push-Pull Type.

TRANSMITTING TUBE GUIDE

FOR EQUIPMENT DESIGN ENGINEERS

CLASS C AMPLIFIERS, RF Telegraphy—(Continued)

(5) Beam Power Tubes—(Continued)

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
90	750	30	6.3	200	•829-B□,*
90	750	30	12.6	200	•829-B□,*
100	600	35	6.3	200	⊡3E22□
100	600	35	12.6	200	⊡3E22□
120	750	40	6.3	200	•829-B□, **
120	750	40	12.6	200	•829-B□, **
180	1250	50	10.0	30	•814
200	1250	70	10.0	30	•828
300	2000	75	5.0	75	4E27/8001
360	2000	100	10.0	30	•813

CLASS C AMPLIFIERS or OSCILLATORS, Self-Rectifying

(1) Triodes

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS RMS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
125	1750	45	6.3	30	Δ811-A
145	1750	45	6.3	30	812-A
240	1750	75	10.0	60	8005
295	2800	100	10.0	30	813
330	1500	100	10.0	30	8003
450	2500	125	10.0	30	8000
1500	4250	600	11.0	160	5786
4900	7000	3000	12.6	30	5762

CLASS C AMPLIFIERS or OSCILLATORS—

With Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
175	1125	45	6.3	30	Δ811-A, 812-A
240	1125	75	10.0	60	8005
330	1200	100	10.0	30	8003
360	1800	100	10.0	30	813
500	1800	125	10.0	30	8000
1500	2700	600	11.0	160	5786
8600	5600	3000	12.6	30	5762

MISCELLANEOUS SERVICES

See data pages for each type.

(1) CONTROL AMPLIFIER	3C33
(2) PLATE-PULSED OSCILLATOR	4C33
(3) PLATE-PULSED OSCILLATOR & AMPLIFIER	5946
(4) PULSE AMPLIFIER & MODULATOR	3E29, 715-C
(5) FIXED-TUNED UHF OSCILLATOR	5794
(6) FREQUENCY MULTIPLIER	5618, 5763

• See NOTE on first page of this GUIDE.
■ For rated max. plate input and voltage.
Δ Not recommended as oscillator in this class of service.
* Natural cooling.
** Forced-air cooling.
□ Push-Pull Type.
⊡ IMS Ratings only—see data pages for this type.

TRANSMITTING TUBE GUIDE

FOR EQUIPMENT DESIGN ENGINEERS

MAX. AV. PLATE AMPERES	MAX. PEAK PLATE AMPERES	MAXIMUM PEAK INVERSE PLATE VOLTS	FILAMENT VOLTS	TYPE
RECTIFIERS				
(1) Half-Wave, Mercury-Vapor				
0.125	0.5	7500 20–60°	2.5	816
0.25	1.0	5000 25–70° 10000 25–60°	2.5	866-A
0.5	2.0	2000 25–70°	2.5	866-A
1.25	5.0	5000 20–70° 10000 20–60°	5.0	872-A 8008
1.75 1.5	7.0 6.0	10000 20–60° 15000 20–50°	5.0	575-A 673
2.5*	10*	10000 30–60° 20000 30–40° *	5.0	869-B
5.0▲ 5.0▲	20▲ 20▲	10000 30–60° 15000 30–50° ▲	5.0	869-B
2.5	15	2000 30–80° 5000 30–60°	5.0	5558
4.0 6.4	16 40	10000 25–50° 3000 40–80°	5.0	5561
10	40	10000 25–65° 22000 30–40°	5.0	857-B

Where two ratings are given for any type, better temperature control is required for the higher voltage rating.

(2) Half-Wave, Gas				
0.5 0.5 0.25	2.0 2.0 1.0	4500 5000 10000	2.5 2.5	3B25 3B28
(3) Half-Wave, High-Vacuum				
0.15 0.25 0.13	0.6 1.0 0.8	7500 5000 6000	10.0 2.5 2.5	217-C 836 1616

* In-Phase Operation
▲ Quadrature Operation

F.C.C. POWER RATINGS*
OF RCA TRANSMITTING TUBES

"The maximum rated carrier power of a standard broadcast transmitter shall be determined as the sum of the applicable power ratings of the vacuum tubes employed in the last radio stage. The approved power ratings of vacuum tubes for operation in the last radio stages of broadcast transmitters are fixed as set out in the following tables:"

TABLE A
High-Level Modulation or Plate Modulation in the Last Radio Stage

Power Rating (watts)	Tube Type
50	808
75	203-A 211 838 850 860
125	4-125A/ 4D21 803 805 810
250	204-A 806 861
350	849
500	833-A
750	851
1000	846
5000	207 891 892 892-R
10000	858 893A-R
25000	9C22 5671
40000	862-A 898-A

TABLE B
Low-Level Modulation or Last Radio Stage Operating as Linear Power Amplifier

Power Rating (watts)	Tube Type
25	203-A
50	803 806 810
75	204-A
125	833-A 849
250	851
500	846
2500	207 892 892-R
5000	858
10000	893A-R
25000	862-A 898-A

TABLE D
Grid Modulation in the Last Radio Stage (Operating Efficiency 35%)

Power Rating (watts)	Tube Type
2500	892

* From Federal Communications Commission's "Standards of Good Engineering Practice Concerning Standard Broadcast Stations (550-1600 kc)," Section 8, Revision of Oct. 30, 1947 and Supplement of Sept., 1949. Ratings apply only for tubes used in the last radio stage of standard broadcast transmitters and may not be applicable to any other service.

← Indicates a change.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

The MAXIMUM RATINGS given for each type on its data pages apply only when the type is operated at frequencies lower than some specified value which depends on the design of the type. As the frequency is raised above the specified value, the radio-frequency currents, dielectric losses, and heating effects increase rapidly. Most types can be operated above their specified maximum frequency provided the plate voltage and plate input are reduced in accordance with the information given in the following tabulation.

TUBE TYPE	OPERATING FREQUENCY *Megacycles per second*	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE & PLATE INPUT		
		TELEPHONY		TELEGRAPHY
		Class B, Class C Grid or Suppressor Modulated	Class C Plate-Modulated	Class C
2E24 & 2E26	125	–	100	100
	150	–	83	83
	160	–	75	75
	175	–	68	68
3E22	15	–	100	100 ←
4-65A	50	–	100	100
4-125A/ 4D21	120	–	100	100
	150	–	84 *Volt.*	80 *Volt.*
	200	–	64	64
	250	–	–	56
4-250A/ 5D22	75	–	100	100
	100	–	75 *Volt.*	72 *Volt.*
	120	–	62	62
4C33	625	Plate-Pulsed Oscillator 100		←
4E27/ 8001	75	100	100	100
	120	90	75	75
	150	80	50	50
4E27A/ 5-1258	75	–	100	100 ←
4X150A	500	–	–	100
4X500A	120	–	–	100
7C24	110	100	100	100
8D21	300	100	–	100 ←
9C21	15	–	100	100
	20	–	88	82
	25	–	81	70
9C22	5	–	100	100
	12	–	90	84
	25	–	81	70
9C25	30	100	100	100
	50	93	87	87
	75	87	74	74
	100	80	61	61

← Indicates a change.

TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

TUBE TYPE	OPERATING FREQUENCY *Megacycles per second*	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE & PLATE INPUT		
		TELEPHONY		TELEGRAPHY
		Class B, Class C Grid or Suppressor Modulated	Class C Plate-Modulated	Class C
10-Y	8	-	100	100
	Not recommended for operation at frequencies above 8 MC.			
203-A	15	100	100	100
	30	88	80	80
	80	70	50	50
204-A	3	100	100	100
	10	84	75	75
	30	69	50	50
207	Same as for Type 892			
211	Same as for Type 203-A			
800	60	100	100	100
	100	90	80	80
	180	79	55	55
801-A	60	100	100	100
	75	93	80	80
	120	78	50	50
802	30	100	100	100
	55	88	77	77
	100	76	55	55
803	20	100	100	100
	40	86	77	77
	60	80	60	60
804	15	100	100	100
	35	88	75	75
	80	76	50	50
805	30	100	100	100
	45	90	82	82
	80	77	55	55
806	30	100	100	100
	50	90	80	80
	100	78	50	50
807	60	100	100	100
	80	90	80	80
	125	75	55	55
808	30	-	100	100
	60	-	75	75
	130	-	50	50
809	60	100	100	100
	70	93	88	88
	120	75	50	50
810	30	100	100	100
	60	88	70	70
	100	80	50	50

TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

TUBE TYPE	OPERATING FREQUENCY *Megacycles per second*	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE & PLATE INPUT		
		TELEPHONY		TELEGRAPHY
		Class B, Class C Grid or Suppressor Modulated	Class C Plate-Modulated	Class C
811-A*	30	-	100	100
	60	-	89	89
	80	-	70	70
	100	-	55	55
812-A□	30	-	100	100
	60	-	89	89
	80	-	70	70
	100	-	55	55
813▲	30	100	100	100
	60	88	75	75
	120	76	50	50
814	30	100	100	100
	50	90	80	80
	75	85	64	64
815	125	100	100	100
	175	85	80	80
	200	75	70	70
826	250	-	100	100
	300	-	80	80
827-R	110	100	100	100
828	30	100	100	100
	50	90	8^	80
	75	80	65	65
829-B	200	-	100	100
	250	-	89	89
830-B	15	100	100	100
	30	87	77	77
	60	74	54	54
832-A	200	-	100	100
	250	-	89	89
833-A, with natural cooling				
	30	100	100	100
	50	98	90	90
	75	94	72	72
833-A, with forced-air cooling				
	20	100	100	100
	50	97	83	83
	75	93	65	65

* In Self-Rectifying Amplifier Service, and in Amplifier Service with Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply, the 811-A has the same maximum permissible percentages as those shown for Class C Telegraphy.

□ In Self-Rectifying Oscillator or Amplifier Service, and in Amplifier or Oscillator Service with Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply, the 812-A has the same maximum permissible percentages as those shown for Class C Telegraphy.

▲ In Self-Rectifying Oscillator or Amplifier Service, and in Amplifier or Oscillator Service with Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply, the 813 has the same maximum permissible percentages as those shown for Class C Telegraphy.

← Indicates a change.

TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

TUBE TYPE	OPERATING FREQUENCY *Megacycles per second*	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE & PLATE INPUT		
		TELEPHONY		TELEGRAPHY
		Class B, Class C Grid or Suppressor Modulated	Class C Plate-Modulated	Class C
834	100 170 350	100 89 73	100 80 53	100 80 53
835	20 40 100	100 85 70	100 80 50	100 80 50
837	20 40 60	– – –	100 76 62	100 76 62
838	30 60 120	100 85 70	100 75 50	100 75 50
841 & 843	6 15 30	100 96 90	100 90 80	100 90 80
846	50 100 150	100 82 73	100 75 60	100 75 50
849	Same as for Type 204-A			
851	3 7 15	100 88 76	100 75 50	100 75 50
860	Same as for Type 838			
861	20 30 60	100 90 75	100 82 53	100 82 53
862-A	Same as for Type 898-A			
865	15 30 60	100 90 78	100 78 55	100 78 55
880		*Voltage* *Input*		
	25	100 100	100	100
	50	80 94	72	75
	75	68 85	56	62
	100	60 75	45	50
889-A	50 100 150	100 85 72	100 75 50	100 75 50
889R-A				*Volt.* *Input*
	40	100	100	100 100
	65	85	78	87 73
	100	72	60	65 50
→ 891	1.6 7.5 20	– – –	– – –	100 75 50
→ 891-R	1.6 7.5 20	– – –	– – –	100 75 50

→ Indicates a change.

TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

TUBE TYPE	OPERATING FREQUENCY *Megacycles per second*	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE & PLATE INPUT		
		TELEPHONY		TELEGRAPHY
		Class B, Class C Grid or Suppressor Modulated	Class C plate-Modulated	Class C
892	1.6	100	100	100
	7.5	85	85	75
	20	76	75	50
892-R	1.6	100	100	100
	7.5	85	75	75
	20	76	50	50
893-A		*Volt.* *Input*	*Volt.* *Input*	*Volt.* *Input*
	5	100 100	100 100	100 100
	20	85 82	80 75	80 66
	40	65 73	64 64	60 50
893A-R				*Volt.* *Input*
	5	100	100	100 100
	12	86	81	81 75
	25	74	65	65 50
898-A	1.6	100	100	100
	Not recommended for operation at frequencies above 1.6 Mc.			
1613	45	–	100	100
	60	–	90	90
	90	–	85	85
1614	80	–	100	100
	120	–	75	75
1619	45	100	100	100
	60	93	90	90
	90	85	77	77
1623	60	100	100	100
	70	93	88	88
	100	80	60	60
1624	60	100	100	100
	80	90	80	80
	125	75	55	55
1625	Same as for Type 807			
1626	30	–	–	100
	60	–	–	96
	90	–	–	93
5556	6	100	100	100
	15	85	75	75
	30	70	50	50
5588	1200	–	100	100
	1350	–	90	90
	1500	–	80	80
	2000	–	80	80

TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

TUBE TYPE	OPERATING FREQUENCY *Megacycles per second*	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE & PLATE INPUT		
		TELEPHONY		TELEGRAPHY
		Class B, Class C Grid of Suppressor Modulated	Class C Plate-Modulated	Class C
5592				*Volt. Input*
	50	–	–	100 100
	75	–	–	85 88
	108	–	–	65 67
5618				*Volt. Input*
	100	–	–	100 100
	165	–	–	100 90
5671	10	–	100	100
	18	–	88	88
	25	–	80	80
5713	220	–	–	100
5762▲	30	–	100	100
	110	–	84	84
	220	–	52	52
	For Television Service, see data pages for this type.			
→ 5763			*Volt. Input*	*Volt. Input*
	50	–	100 100	100 100
	175	–	100 80	100 80
5770	20	–	100	100
	27	–	88	88
	35	–	77	77
5771				*Volt. Input*
	1.6	100	100	120 112.5
	25	100	100	100
	50	75	75	75
5786	160	–	100	100
5831	See data pages for this type.			
5946		*Plate-Pulsed Oscillator and Amplifier Service*		
	1300	100		
	2000	75		
6146			*Volt. Input*	*Volt. Input*
	60	–	100 100	100 100
	120	–	67 79	67 79
	175	–	53 66	53 66
	See Curve Charts under data for this type.			
6159		Same as for type 6146		
6161	900	–	100	100
	1200	–	80	80
	1400	–	71	71
	1650	–	62.5	62.5
	2000	–	62.5	62.5
	For Television Service, see data pages for this type.			

▲ In Self-Rectifying Oscillator or Amplifier Service, and in Amplifier or Oscillator Service with Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply, the 5762 has the same maximum permissible percentages as those shown for Class C Telegraphy.

→ Indicates a change.

TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

TUBE TYPE	OPERATING FREQUENCY *Megacycles per second*	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE & PLATE INPUT		
		TELEPHONY		TELEGRAPHY
		Class B, Class C Grid or Suppressor Modulated	Class C plate-Modulated	Class C
6166	30	–	100	100
	220	–	90	90
	For Television Service, see data pages for this type.			
6181	900	–	100	100
	For Television Service, see data pages for this type.			
6524			*Volt. Input*	*Volt. Input*
	100	–	100 100	100 100 ←
	220	–	79 80	79 78
	470	–	75 53	76 51
	See Curve Charts under data for this type.			
8000	Same as for Type 810			
8001	See 4E27/8001			
8003	30	100	100	100
	50	90	83	83
8005	60	100	100	100
	80	90	75	75
	100	83	60	60
8012-A and 8025-A	500	100	100	100
	600	80*	70*	70*
	* Maximum permissible percentage of only maximum plate voltage: the maximum plate input may be 100% of its rated value.			

← indicates a change

RECOMMENDED STANDBY CONDITIONS FOR TRANSMITTING TUBES

TUBE TYPE BY KIND OF CATHODE *Filament or Heater-Cathode*	RECOMMENDED PERCENTAGE OF NORMAL OPERATING FILAMENT OR HEATER VOLTAGE FOR STANDBY PERIODS AS FOLLOWS:			
	Under 15 Minutes	15 Min. to 2 Hours	2 Hours to 12 Hours	Over 12 Hours
Pure-Tungsten Filaments: Large Tubes— Such as 889R-A, 5592, 9C21	80	80	80	Off
Thoriated-Tungsten Filaments: Small and Medium Tubes— Such as 813, 833-A, 5762	80	Off	Off	Off
Large Tubes— Such as 5771, 5671, 5770	80	80	Off	Off
Oxide-Coated Filaments: Vacuum Tubes— Such as 5618, 2E24	80	Off	Off	Off
Mercury-Vapor Tubes— Such as 816, 866-A, 857-B	100	100	100	Off
Gas Tubes— Such as 3B25	100	Off	Off	Off
Oxide-Coated Heater-Cathodes: Vacuum Tubes— Such as 5763, 807, 829-B	100	80	Off	Off
Mercury-Vapor Tubes Such as 5558, 5561	100	100	100	Off

CIRCUITS FOR HOT-CATHODE MERCURY-VAPOR & GAS RECTIFIER TUBES

Numerical Relationships Among Electrical Quantities

E = Trans. Sec. Voltage (RMS)
E_{av} = Average DC Output Voltage
E_{bmi} = Peak Inverse Anode Voltage
E_m = Peak DC Output Voltage
E_r = Major Ripple Voltage (RMS)
f = Supply Frequency
f_r = Major Ripple Frequency
I_{av} = Average DC Output Current
I_b = Average Anode Current
I_p = Anode Current (RMS)
I_{pm} = Peak Anode Current
P_{al} = Line Volt-Amperes
P_{ap} = Trans. Pri. Volt-Amperes
P_{as} = Trans. Sec. Volt-Amperes
P_{dc} = DC Power ($E_{av} \times I_{av}$)

Note: Conditions assumed involve sine-wave supply; zero voltage drop in tubes; no losses in transformer and circuit; no back emf in the load circuit; and no phase-back.

RATIO	Fig. 1	Fig. 2	Fig. 3	Fig. 4	Fig. 5*	Fig. 6	Fig. 7	Fig. 8
Voltage Ratios								
E/E_{av}	2.22	1.11	1.11	0.854	0.854	0.427	0.785	0.74
E_{bmi}/E	1.41	2.83	1.41	2.45	2.45	2.45	2.83	2.83
E_{bmi}/E_{av}	3.14	3.14	1.57	2.09	2.09	1.05	2.22	2.09
E_m/E_{av}	3.14	1.57	1.57	1.21	1.05	1.05	1.11	1.05
E_r/E_{av}	1.11	0.472	0.472	0.177	0.04	0.04	0.106	0.04
Frequency Ratio								
f_r/f	1	2	2	3	6	6	4	6
Current Ratios								
I_p/I_{av}	1.57	0.785	0.785	0.578	0.289	0.578	0.5	0.408
I_b/I_{av}	1	0.5	0.5	0.33	0.167	0.33	0.25	0.167
Resistive Load								
I_{pm}/I_{av}	3.14	1.57	1.57	1.21	0.52	1.05	1.11	1.05
I_{pm}/I_b	3.14	3.14	3.14	3.63	3.14	3.14	4.5	6.3
Inductive Load□								
I_{pm}/I_{av}	—	1	1	1	0.5	1	1	1
Power Ratios								
Resistive Load								
P_{as}/P_{dc}	3.49	1.74	1.24	—	—	—	—	—
P_{ap}/P_{dc}	2.69	1.23	1.24	—	—	—	—	—
P_{al}/P_{dc}	2.69	1.23	1.24	—	—	—	—	—
Inductive Load□								
P_{as}/P_{dc}	—	1.57	1.11	1.71	1.48	1.05	1.57	1.81
P_{ap}/P_{dc}	—	1.11	1.11	1.21	1.05	1.05	1.11	1.29
P_{al}/P_{dc}	—	1.11	1.11	1.21	1.05	1.05	1.11	1.05

* Bleeder current of 2% full-load current will provide exciting current for balance coil and thus avoid poor regulation at light loading.

□ The use of a large filter-input choke is assumed.

CIRCUITS FOR HOT-CATHODE MERCURY-VAPOR & GAS RECTIFIER TUBES

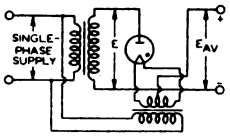


FIG. 1 HALF-WAVE SINGLE-PHASE

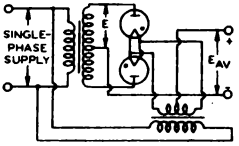


FIG. 2 FULL-WAVE SINGLE-PHASE

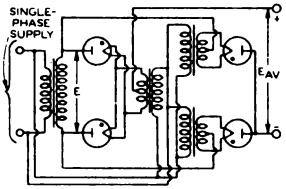


FIG. 3 SERIES SINGLE-PHASE

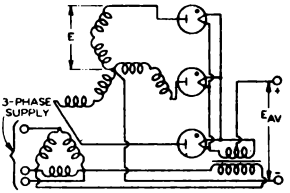


FIG. 4 HALF-WAVE THREE-PHASE

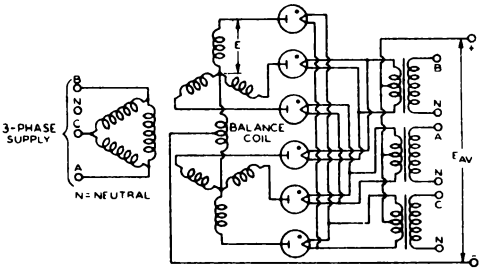


FIG. 5 PARALLEL THREE-PHASE (QUADRATURE OPERATION)

92CL-7873A

CIRCUITS FOR HOT-CATHODE MERCURY-VAPOR & GAS RECTIFIER TUBES

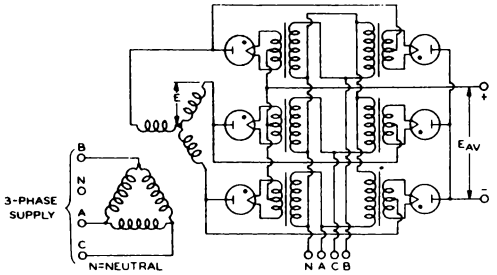


FIG. 6 SERIES THREE-PHASE (QUADRATURE OPERATION)

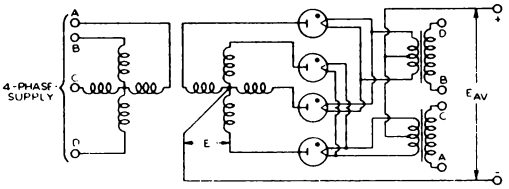


FIG. 7 HALF-WAVE FOUR-PHASE (QUADRATURE OPERATION)

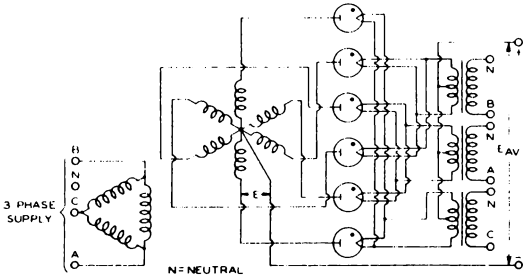


FIG. 8 HALF-WAVE SIX-PHASE (QUADRATURE OPERATION)

92CL-7673B

2C39-A

UHF POWER TRIODE

FORCED-AIR COOLED

Particularly suitable for grounded-grid circuits

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

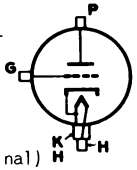
Voltage*	6.3 ± 10%	ac or dc	volts
Current	1.0		amp
Heating Time	1		minute
Amplification Factor	100		
Transconductance, for plate current of 70 ma and plate voltage of 600 volts	22000		μmhos
Direct Interelectrode Capacitances:			
Grid to Plate	1.95		μμf
Grid to Cathode	6.5		μμf
Plate to Cathode	0.035 max.		μμf

Mechanical:

Terminal Connections:

G - GRID TERMINAL (Adjacent to Cathode & Heater Terminal)

H - HEATER TERMINALS (Cylinder within Cathode Terminal & Cathode Terminal)



K - CATHODE TERMINAL (Outside Cylinder on End Opposite Radiator)

P - PLATE TERMINAL (Between Plate Flange & Glass Section)

Mounting Position	Any
Maximum Overall Length	2-3/4"
Diameter	1-1/4" ± 1/64"
Radiator	Integral part of tube
Mounting	Special

Air Flow:

Through Radiator--Adequate air flow should be delivered by a blower during the application of any voltages. Cooling must be sufficient to limit the radiator temperature to the specified maximum value. See Curves.

To Plate, Grid, Cathode, and Heater Seals--A sufficient quantity of air should be delivered to these seals to prevent their temperature from exceeding the specified maximum value.

Incoming-Air Temperature	45 max.	°C
Radiator Temperature (Measured on core adjacent to plate seal)	175 max.	°C
Seal Temperature (Plate, grid, cathode, and heater)	175 max.	°C

* Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life. For most applications where liberal cooling of the seals is provided, reduction of heater voltage to the values shown in the following table is suggested.

2C39-A
UHF POWER TRIODE

Frequency Mc	*Heater Voltage Volts*
Up to 400	6.3
400 to 1000	6.0
1000 to 1500	5.5
1500 to 2000	5.0
2000 and above	4.5

Permitted tolerance on the heater-voltage values in the above table is ± 10%. However, for long tube life, it is recommended that the tolerance be held to ± 5%.

When long life in continuous service is desired, the 2C39-A should always be put in operation with full rated heater voltage (6.3 volts) which should then be reduced to the lowest value that will give the desired output.

PLATE-MODULATED RF POWER AMP.--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	600♦	max.	volts
GRID VOLTAGE:			
DC	-150	max.	volts
Peak Negative RF	-400	max.	volts
Peak Positive RF	30	max.	volts
DC GRID CURRENT	50	max.	ma
DC CATHODE CURRENT	100	max.	ma
PLATE DISSIPATION	70	max.	watts
GRID DISSIPATION	2	max.	watts

RF POWER AMP. & OSCILLATOR--Class C Telegraphy

Key-down conditions per tube without amplitude modulation#

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1000	max.	volts
GRID VOLTAGE:			
DC	-150	max.	volts
Peak Negative RF	-400	max.	volts
Peak Positive RF	30	max.	volts
DC GRID CURRENT	50	max.	ma
DC CATHODE CURRENT	125	max.	ma
PLATE DISSIPATION	100	max.	watts
GRID DISSIPATION	2	max.	watts

Typical Operation as Amplifier in Grounded-Grid Circuit at 500 Mc:

DC Plate Voltage	800	volts

♦ For less than 100% modulation, it is permissible to use a higher dc plate voltage provided the sum of the peak positive modulating voltage and the dc plate voltage does not exceed 1200 volts.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●: See next page.

2C39-A

UHF POWER TRIODE

DC Grid Voltage	-45	volts
DC Plate Current	80	ma
DC Grid Current (Approx.)	35	ma
Driver Power Output (Approx.)	6	watts
Useful Power Output (Approx.)	27	watts

Typical Operation as Oscillator at 2500 Mc:▲

DC Plate Voltage	900	volts
DC Grid Voltage (Approx.)	-22	volts
DC Plate Current	90	ma
DC Grid Current (Approx.)	27	ma
Useful Power Output (Minimum)	12	watts

FREQUENCY MULTIPLIER--Class C

Maximum CCS● Ratings, *Absolute Values:*

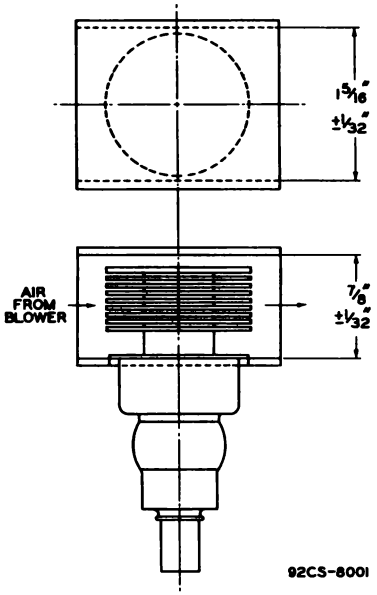
DC PLATE VOLTAGE	1000 max.	volts
GRID VOLTAGE:		
DC	-150 max.	volts
Peak Negative RF	-400 max.	volts
Peak Positive RF	30 max.	volts
DC GRID CURRENT	50 max.	ma
DC CATHODE CURRENT	125 max.	ma
PLATE DISSIPATION	100 max.	watts
GRID DISSIPATION	2 max.	watts

● Continuous Commercial Service.

▲ These conditions are for a grid-blocking oscillator and conform to the JAN-1A specifications (27 September 1950) for the 2C39-A.

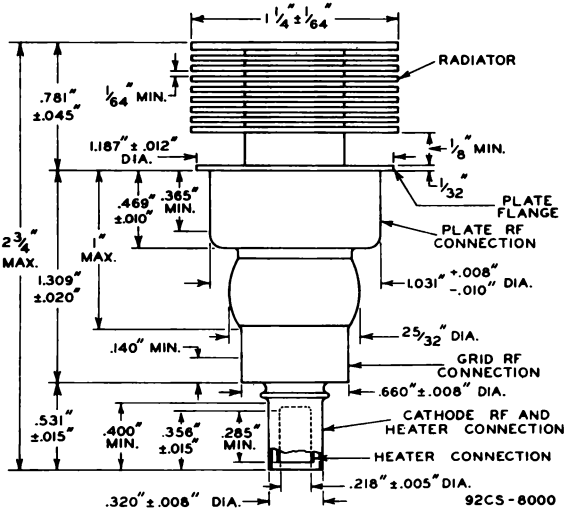
2C39-A
UHF POWER TRIODE

Recommended Cowling for Directing Air Flow Through Radiator of Type 2C39-A.



2C39-A

UHF POWER TRIODE

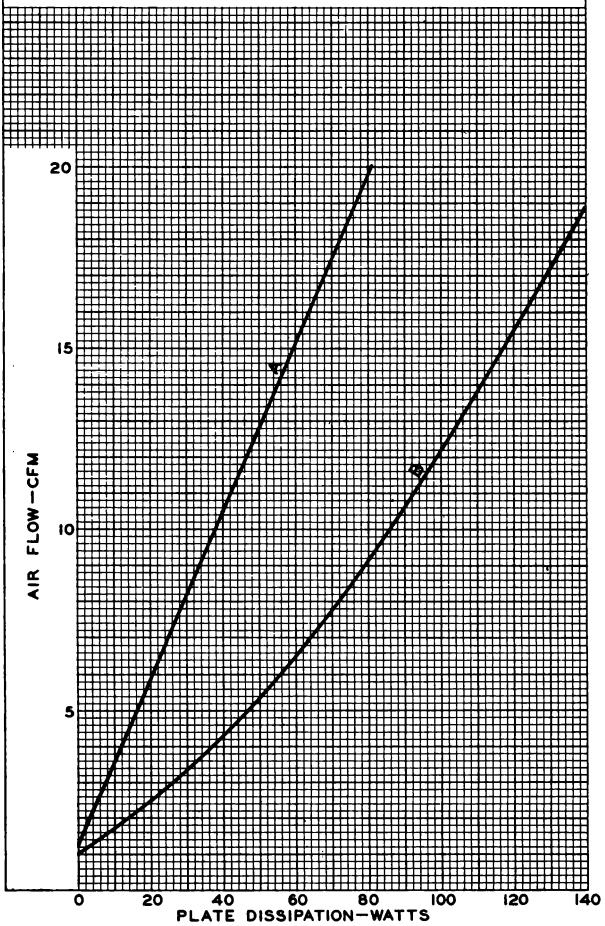


2C39-A

COOLING REQUIREMENTS

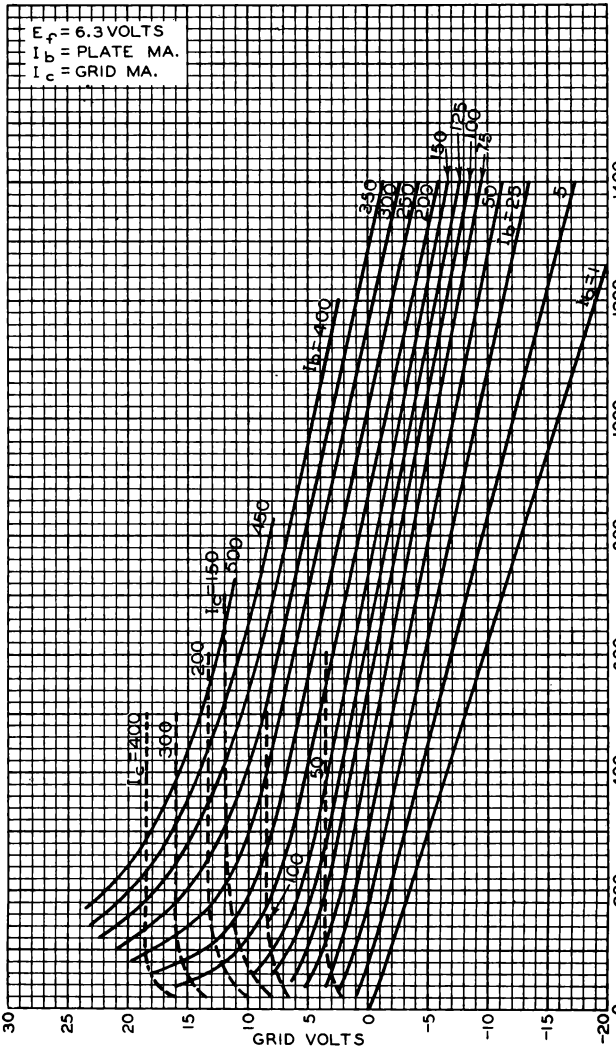
CURVE A: WITH AIR FLOW DIRECTED THROUGH RADIATOR FROM ½" X 2" ORIFICE LOCATED 1½" FROM RADIATOR.

CURVE B: WITH AIR FLOW DIRECTED THROUGH RADIATOR WITH COWLING AS SHOWN ON BACK OF THE DATA 2 SHEET FOR THIS TYPE



2C39-A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



MAY 19, 1953

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7998

2E24

VHF BEAM POWER AMPLIFIER

GENERAL DATA

Electrical:

Filament, Coated:

Voltage	6.3 ± 10%	ac or dc volts
Current	0.65	amp
Heating Time	Less than 2 seconds	
Transconductance, for plate volts = 500, grid-No.2 volts = 200 and plate ma. = 16	3200	μmhos
Mu-Factor, Grid No.2 to Grid No.1 for plate volts and grid-No.2 volts = 200, and plate ma. = 16	7.5	

Direct Interelectrode Capacitances:°

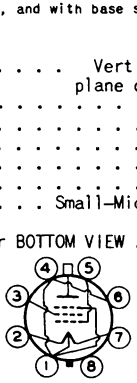
Grid No.1 to Plate	0.11 max.	μμf
Input	8.5	μμf
Output	6.5	μμf

° With no external shielding, and with base sleeve connected to ground.

Mechanical:

Mounting Position	Vertical, or horizontal with plane of pins 3 and 7 vertical
Maximum Overall Length	3-21/32"
Seated Length	2-15/16 ± 5/32"
Maximum Diameter	1-5/16"
Bulb	T-9
Cap	Small
Base	Small-Micanol-Wafer Octal 8-Pin, with Sleeve No.R6159
Basing Designation for BOTTOM VIEW	7CL

Pin 1 - Grid No.3, Int.Shield & Filament Center-Tap
Pin 2 - Filament
Pin 3 - Grid No.2



Pin 4 - Same as Pin 1
Pin 5 - Grid No.1
Pin 6 - Same as Pin 1
Pin 7 - Filament
Pin 8 - Base Sleeve
Cap - Plate

AF POWER AMPLIFIER & MODULATOR- Class A_1†

Maximum Ratings, ***Absolute Values*****:**

	CCS●	
DC PLATE VOLTAGE	300 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	200 max.	volts
GRID-No.2 INPUT	2.5 max.	watts
PLATE DISSIPATION	10 max.	watts

Typical Operation:

DC Plate Voltage	250	volts
DC Grid-No.2 Voltage	160	volts

† Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

●: See next page. ← Indicates a change.

2E24

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VHF BEAM POWER AMPLIFIER

	CCS●	
DC Grid-No.1 (Control-Grid) Voltage□● . . .	-8	volts
Peak AF Grid-No.1 Voltage.	8	volts
Zero-Signal DC Plate Current	35	ma
Max.-Signal DC Plate Current	40	ma
Zero-Signal DC Grid-No.2 Current	2.6	ma
Max.-Signal DC Grid-No.2 Current..	6.8	ma
Load Resistance.	6000	ohms
Total Harmonic Distortion.	10	%
Power Output	3.9	watts

→ **AF POWER AMPLIFIER & MODULATOR- Class AB_2▲**

Maximum Ratings, ***Absolute Values*:**

	CCS●	ICAS●●	
DC PLATE VOLTAGE	400 max.	500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	200 max.	200 max.	volts
MAX.-SIG. DC PLATE CURRENT§. .	75 max.	75 max.	ma
MAX.-SIG. PLATE INPUT§	30 max.	37.5 max.	watts
MAX.-SIG. GRID-No.2 INPUT§ . .	2.5 max.	2.5 max.	watts
PLATE DISSIPATION§	10 max.	13.5 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	400	500	volts
DC Grid-No.2 Voltage	125	125	volts
DC Grid-No.1 (Control Grid) Voltage□*.	-15	-15	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	82	82	volts
Zero-Signal DC Plate Current .	18	20	ma
Max.-Signal DC Plate Current .	150	150	ma
Zero-Signal DC Grid-No.2 Cur.	0.6	0.6	ma
Max.-Signal DC Grid-No.2 Cur.	26	28	ma
Effective Load Resistance, (Plate-to-plate) .	7000	9000	ohms
Max.-Signal Driving Power, (Approx.)♦ .	0.43	0.46	watt
Max.-Signal Power Output (Approx.). .	42	54	watts

▲ Subscript 2 indicates that grid-No.1 current flows during some part of input cycle.

§ Averaged over any audio-frequency cycle of sine-wave form.

♦ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the AB_2 stage. The effective resistance per grid-No.1 circuit of the AB_2 stage should be held at low value.

● The type of input-coupling network used should not introduce too much resistance in the grid-No.1 circuit. Transformer or impedance coupling devices are recommended. When grid No.1 is operated in the negative region with fixed bias, the dc grid-No.1-circuit resistance should not exceed 100000 ohms. For higher values of dc grid-No.1-circuit resistance, cathode bias is required. Under no circumstances should the total dc grid-No.1-circuit resistance exceed 0.5 megohm.

●,●●,□,*: See next page. → indicates a change.

2E24

VHF BEAM POWER AMPLIFIER

PLATE-MODULATED RF POWER AMPLIFIER- Class C Telephony ←

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values*****:**

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	400 max.	500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	200 max.	200 max.	volts
DC GRID-No.1 (CONTROL GRID) VOLTAGE.	-175 max.	-175 max.	volts
DC PLATE CURRENT	60 max.	70 max.	ma
DC GRID-No.1 CURRENT	3.5 max.	3.5 max.	ma
PLATE INPUT.	20 max.	27 max.	watts
GRID-No.2 INPUT.	1.7 max.	2.3 max.	watts
PLATE DISSIPATION.	6.7 max.	9 max.	watts

Typical Operation:

DC Plate Voltage	400	500	volts
DC Grid-No.2 Voltage♦	180	180	volts
From a series resistor of. .	27500	40000	ohms
DC Grid-No.1 Voltage○□*. . . .	-45	-45	volts
From a grid resistor of. . .	18000	18000	ohms
Peak RF Grid-No.1 Voltage. . .	61	62	volts
DC Plate Current	50	54	ma
DC Grid-No.2 Current	8	8	ma
DC Grid-No.1 Current (Approx.)	2.5	2.5	ma
Driving Power (Approx.).	0.15	0.16	watt
Power Output (Approx.)	13.5	18	watts

RF POWER AMPLIFIER AND OSCILLATOR- Class C Telegraphy ←

Key-down conditions per tube without amplitude modulation##

Maximum Ratings, ***Absolute Values*****:**

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	500 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	200 max.	200 max.	volts
DC GRID-No.1 (CONTROL GRID) VOLTAGE.	-175 max.	-175 max.	volts
DC PLATE CURRENT	75 max.	85 max.	ma
DC GRID-No.1 CURRENT	3.5 max.	3.5 max.	ma
PLATE INPUT.	30 max.	40 max.	watts
GRID-No.2 INPUT.	2.5 max.	2.5 max.	watts
PLATE DISSIPATION.	10 max.	13.5 max.	watts

♦ Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate supply through series resistor of the value shown.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

○ Obtained from grid resistor of value shown, or by partial self-bias methods.

●,●●,□,*: See next page. ←Indicates a change.

2E24

2E24

VHF BEAM POWER AMPLIFIER

	CCS●		ICAS●●	
Typical Operation up to 125 Mc:				
DC Plate Voltage	400	500	600	volts
DC Grid-No.2 Voltage●● . . .	200	190	195	volts
From a series resistor of.	20000	29500	40500	ohms
DC Grid-No.1 Voltage■□*. . .	-45	-45	-50	volts
From a grid resistor of. .	15000	15000	16700	ohms
Peak RF Grid-No.1 Voltage. .	62	65	71	volts
DC Plate Current	75	60	66	ma
DC Grid-No.2 Current	10	10.5	10	ma
DC Grid-No.1 Current (Approx.)	3	3	3	ma
Driving Power (Approx.). . .	0.19	0.20	0.21	watt
Power Output (Approx.) . . .	20	20	27	watts
Typical Operation up to 160 Mc:				
DC Plate Voltage	–		350	volts
DC Grid-No.2 Voltage●● . . .	–		170	volts
From a series resistor of.	–		18000	ohms
DC Grid-No.1 Voltage■□*. . .	–		-50	volts
From a grid resistor of. .	–		16500	ohms
Peak RF Grid-No.1 Voltage. .	–		70	volts
DC Plate Current	–		85	ma
DC Grid-No.2 Current	–		10	ma
DC Grid-No.1 Current (Approx.)	–		3	ma
Driving Power (Approx.). . .	–		2.0	watts
Power Output (Approx.) . . .	–		16.5	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	0.59	0.71	amp
Grid No.1-Plate Capacitance.	2	–	0.11	μμf
Input Capacitance.	2	7	10	μμf
Output Capacitance	2	4.9	8.1	μμf
Plate Current.	1,3	24	46	ma
Grid-No.2 Current.	1,3	–	5	ma
Grid-No.1 Current.	1,4	–	-5	μa
Useful Power Output.	1,5	18	–	watts

Note 1: With 6.3 volts ac on filament.

Note 2: With no external shield. Base pin No.8 grounded.

Note 3: With dc plate voltage of 200 volts, dc grid-No.2 voltage of 135 volts, and dc grid-No.1 voltage of -5 volts.

Note 4: With dc plate voltage of 500 volts, dc grid-No.2 voltage of 200 volts, and dc grid-No.1 voltage adjusted to give dc plate current of 20 ma.

Note 5: With dc plate voltage of 500 volts, dc grid-No.2 voltage of 200 volts, grid-No.1 resistor of 0.015 megohm ± 10%, dc plate current of 60 ma., dc grid-No.1 current of 2.5 to 3.5 ma., and frequency of 15 Mc.

● Continuous Commercial Service.

●● Intermittent Commercial & Amateur Service.

□ With ac on filament.

*, ■●, ■: See next page.

2E24

VHF BEAM POWER AMPLIFIER

* When grid No.1 is driven positive and the 2E24 is operated at maximum ratings, the total dc grid-No.1-circuit resistance should not exceed 30000 ohms. If additional bias is required, it must be supplied by a cathode resistor or fixed supply. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100000 ohms.

⊛ Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor of the value shown. The grid-No.2 voltage must not exceed 600 volts under key-up conditions.

■ Obtained from fixed supply or by grid-No.1 resistor of value shown.

Data on operating frequencies for the 2E24 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

OUTLINE DIMENSIONS
for the 2E24 are the same as those for the 2E26

OPERATING NOTES

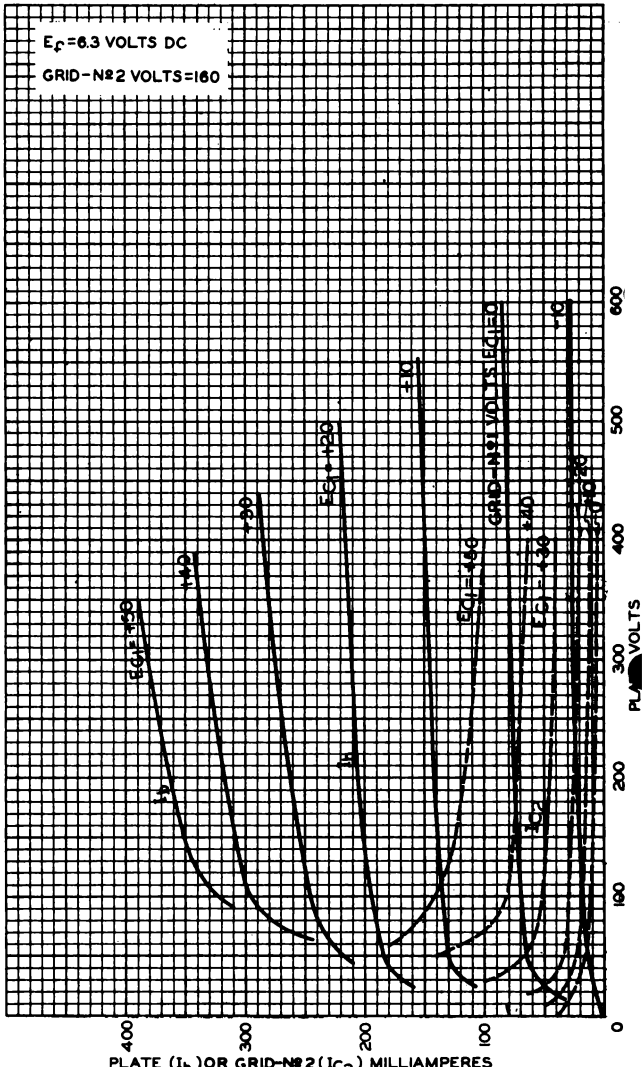
The 2E24 is intended for use in mobile and emergency-communications equipment. Its filament combines sturdiness and efficiency with quick heating and provides wide latitude in operating-voltage range. Although designed for intermittent operation, the filament will give reasonable life when it is operated continuously. In continuous-service applications where extremely long life is desired, it is recommended that the heater-cathode type 2E26 be used.

2E24

RCA

2E24

AVERAGE PLATE CHARACTERISTICS



AUG. 22, 1949

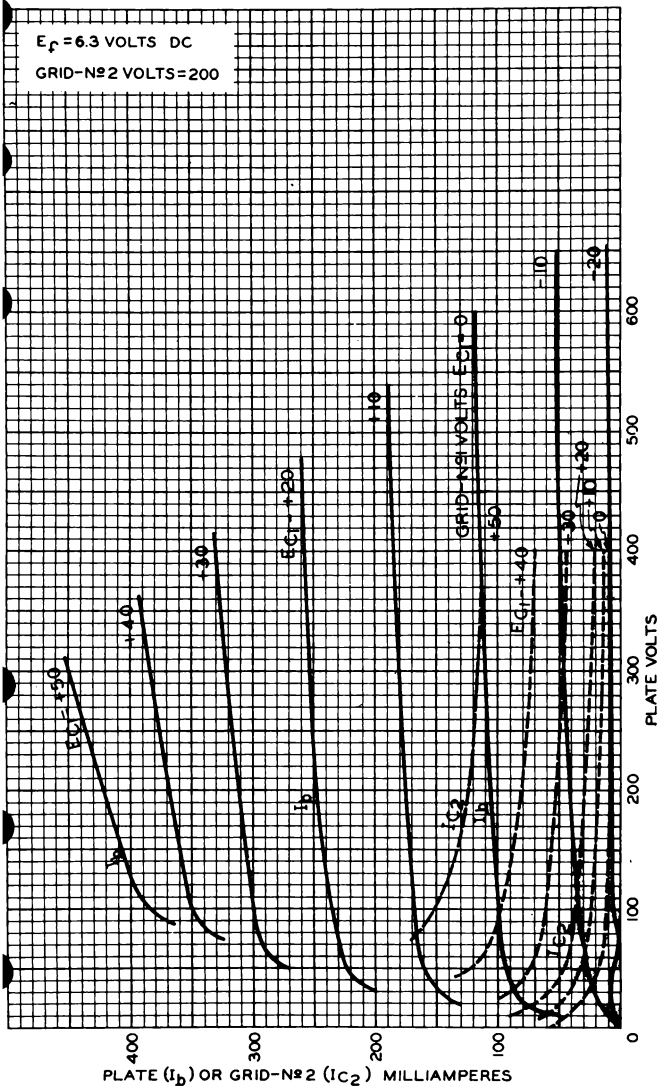
TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6660R1

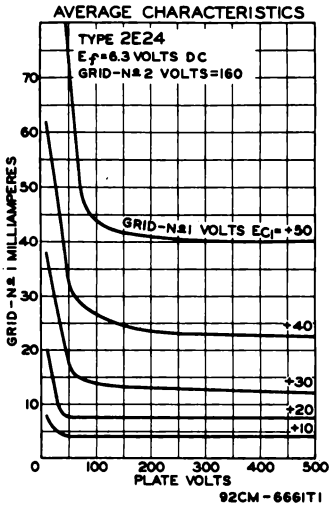
2E24

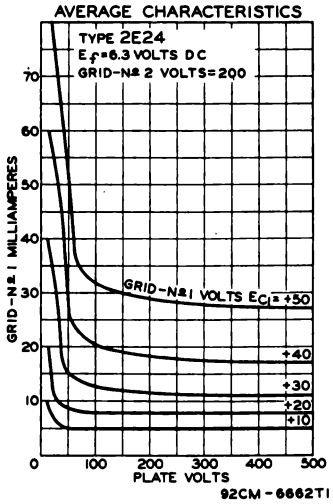
AVERAGE PLATE CHARACTERISTICS



2E24

2E24
VHF BEAM POWER AMPLIFIER





TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

2E26

BEAM POWER TUBE

Useful at frequencies up to 175 Mc

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage	6.3 ± 10%	ac or dc volts	←
Current	0.8	amp	
Transconductance, for plate volts = 500, grid-No.2 volts = 200, and plate ma. = 20	3500	μmhos	
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 200, grid-No.2 volts = 200, and plate ma. = 20	6.5		

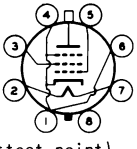
Direct Interelectrode Capacitances (With no external shield):

Grid No.1 to plate	0.2 max.	μμf	
Grid No.1 to cathode & grid No.3, grid No.2, internal shield, base sleeve, and heater	12.5	μμf	←
Plate to cathode, & grid No.3, grid No.2, internal shield, base sleeve, and heater	7	μμf	

Mechanical:

Mounting Position	Any
Overall Length	3-1/2" ± 5/32"
Seated Length	2-15/16" ± 5/32"
Maximum Diameter	1-5/16"
Bulb	T-9
Cap	Small (JETEC No.C1-1)
Base	Small-Micanol-Wafer Octal 8-Pin with Sleeve (JETEC No.B8-44)

BOTTOM VIEW



Pin 1 - Cathode, Grid No.3, Internal Shield
Pin 2 - Heater
Pin 3 - Grid No.2
Pin 4 - Same as Pin 1
Pin 5 - Grid No.1
Pin 6 - Same as Pin 1
Pin 7 - Heater
Pin 8 - Base Sleeve
Cap - Plate

Bulb Temperature (At hottest point)	210 max.	°C	←
Weight (Approx.)	1.4	ounces	←

AF POWER AMPLIFIER & MODULATOR - Class A_1 †

Maximum Ratings, *Absolute Values:*

	CCS●	
DC PLATE VOLTAGE	300 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	200 max.	volts
PLATE DISSIPATION	10 max.	watts
GRID-No.2 INPUT	2.5 max.	watts

● †: See next page. ← Indicates a change.

2E26

BEAM POWER TUBE

	CCS●	
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode .	100 max.	volts
Heater positive with respect to cathode .	100 max.	volts
Typical Operation:		
DC Plate Voltage	250	volts
DC Grid-No.2 Voltage	160	volts
DC Grid-No.1 (Control-Grid) Voltage	-14	volts
Peak AF Grid-No.1 Voltage	14	volts
Zero-Signal DC Plate Current	35	ma
Max.-Signal DC Plate Current	42	ma
Zero-Signal DC Grid-No.2 Current	7	ma
Max.-Signal DC Grid-No.2 Current	10	ma
Load Resistance	5500	ohms
Total Harmonic Distortion	10	%
→ Power Output	4	watts
→ **Maximum Circuit Values:**		
Grid-No.1-Circuit Resistance:[oo]		
With fixed bias	0.1 max.	megohm
With cathode bias	0.5 max.	megohm

→ **AF POWER AMPLIFIER & MODULATOR--Class AB_2#**

	CCS●	ICAS●●	INS○	
Maximum Ratings, *Absolute Values:*				
DC PLATE VOLTAGE . . .	400 max.	500 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	200 max.	200 max..	200 max.	volts
MAX.-SIGNAL DC PLATE CURRENT** . .	75 max.	75 max.	75 max.	ma
MAX.-SIGNAL PLATE INPUT**	30 max.	37.5 max.	45 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT**	2.5 max.	2.5 max.	2.5 max.	watts
PLATE DISSIPATION** . .	10 max.	12.5 max.	17 max.	watts
PEAK HEATER-CATHODE VOLTAGE:				
Heater negative with respect to cathode	100 max.	100 max.	100 max.	volts
Heater positive with respect to cathode	100 max.	100 max.	100 max.	volts

[oo] The type of input-coupling network used should not introduce too much resistance in the grid-No.1 circuit. Transformer or impedance coupling devices are recommended. When grid No.1 is operated in the negative region with fixed bias, the dc grid-No.1-circuit resistance should not exceed the specified value of 0.1 megohm. For higher values of dc grid-No.1-circuit resistance, cathode bias is required. Under no circumstances should the total dc grid-No.1-circuit resistance exceed the specified value of 0.5 megohm.

† Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

#,**,●,●●,○: See next page. → Indicates a change.

2E26

BEAM POWER TUBE

Typical Operation:

	CCS●	ICAS●●	IMS○	
Values are for 2 tubes				
DC Plate Voltage	400	500	600	volts
DC Grid-No.2 Voltage▲♣ .	125	125	125	volts
DC Grid-No.1 (Control-Grid) Voltage:				
From fixed-bias source	-15	-15	-20	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage . .	60	60	102	volts
Zero-Signal DC Plate Current	20	22	26	ma
Max.-Signal DC Plate Current	150	150	150	ma
Max.-Signal DC Grid-No.2 Current . .	32	32	32	ma
Effective Load Resistance (Plate to plate)	6200	8000	8800	ohms
Max.-Signal Driving Power (Approx.)♦ . .	0.36	0.36	0.91	watt
Max.-Signal Power Output (Approx.) . .	42	54	58	watts

Maximum Circuit Values (CCS, ICAS, or IMS Conditions):

Grid-No.1-Circuit Resistance:♦

With fixed bias . . . . . 30000 max. ohms

With cathode bias . . . . . Not recommended

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS●	ICAS●●	IMS○	
Maximum Ratings, *Absolute Values:*				
DC PLATE VOLTAGE. . . .	400 max.	500 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	200 max.	200 max.	200 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .	-175 max.	-175 max.	-175 max.	volts
DC PLATE CURRENT . . .	60 max.	70 max.	70 max.	ma
DC GRID-No.1 CURRENT .	3.5 max.	3.5 max.	3.5 max.	ma
PLATE INPUT	20 max.	27 max.	37 max.	watts

\# Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

** Averaged over any audio-frequency cycle of sine-wave form.

▲ Preferably obtained from a separate source or from the plate-voltage supply with a voltage divider.

♣ In applications requiring the use of screen voltages above 135 volts, provision should be made for the adjustment of grid-No.1 bias for each tube separately. The necessity for this adjustment at the lower screen voltages depends on the distortion requirements and on whether the plate dissipation rating is exceeded at zero-signal plate current.

♦,●,●●,○: See next page. ← Indicates a change.

2E26

RCA

2E26

BEAM POWER TUBE

	CCS●	ICAS●●	IMS°	
GRID-No.2 INPUT	1.7 max.	2.3 max.	2.5 max.	watts
PLATE DISSIPATION . . .	6.7 max.	9 max.	12 max.	watts
PEAK HEATER-CATHODE VOLTAGE:				
Heater negative with respect to cathode	100 max.	100 max.	100 max.	volts
Heater positive with respect to cathode	100 max.	100 max.	100 max.	volts
Typical Operation:				
DC Plate Voltage . . .	400	500	600	volts
DC Grid-No.2 Voltage♦ .	160	180	200	volts
From a series resistor of	32000	35500	40000	ohms
DC Grid-No.1 Voltage★ .	-50	-50	-50	volts
From a grid resistor of	20000	20000	20000	ohms
Peak RF Grid-No.1 Voltage	60	60	60	volts
DC Plate Current . . .	50	54	60	ma
DC Grid-No.2 Current .	7.5	9	10	ma
DC Grid-No.1 Current (Approx.)	2.5	2.5	2.5	ma
Driving Power (Approx.)	0.15	0.15	0.15	watt
Power Output (Approx.).	13.5	18	24	watts
Maximum Circuit Values (CCS, ICAS, or IMS Conditions):				
Grid-No.1-Circuit Resistance‡		30000 max.		ohms

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy□ and RF POWER AMPLIFIER--Class C FM Telephony

	CCS●	ICAS●●	IMS°	
Maximum Ratings, *Absolute Values:*				
DC PLATE VOLTAGE . . .	500 max.	600 max.	700 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	200 max.	200 max.	200 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-175 max.	-175 max.	-175 max.	volts
DC PLATE CURRENT . . .	75 max.	85 max.	85 max.	ma

♦ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the AB_2 stage. To minimize distortion, the effective resistance per grid-No.1 circuit of the AB_2 stage should be held at a low value. For this purpose, the use of transformer coupling is recommended. In no case, however, should the total dc grid-No.1-circuit resistance exceed 30000 ohms when the 2E26 is operated at maximum ratings. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100000 ohms.

♦ Obtained preferably from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor.

★ Obtained from grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

□ Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●,●●,°,‡: See next page. → Indicates a change.

BEAM POWER TUBE

	CCS●	ICAS●●	IMS°	
DC GRID-No.1 CURRENT	3.5 max.	3.5 max.	3.5 max.	ma
PLATE INPUT	30 max.	40 max.	55 max.	watts
GRID-No.2 INPUT	2.5 max.	2.5 max.	2.5 max.	watts
PLATE DISSIPATION	10 max.	13.5 max.	18.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:				
Heater negative with respect to cathode	100 max.	100 max.	100 max.	volts
Heater positive with respect to cathode	100 max.	100 max.	100 max.	volts

	Up to 125 Mc		*At 160 Mc*	
Typical CCS● Operation:				
DC Plate Voltage	400	500	300	volts
DC Grid-No.2 Voltage●●	190	185	170	volts
From a series resistor of	19000	28500	21500	ohms
DC Grid-No.1 Voltage■	-30	-40	-75	volts
From a grid-No.1 resistor of	10000	13500	30000	ohms
Peak RF Grid-No.1 Voltage	41	50	85	volts
DC Plate Current	75	60	75	ma
DC Grid-No.2 Current	11	11	6	ma
DC Grid-No.1 Current (Approx.)	3	3	2.5	ma
Driving Power (Approx.)	0.12	0.15	1.5	watts
Power Output (Approx.)	20	20	13	watts
Typical ICAS●● Operation:				
DC Plate Voltage	600		350	volts
DC Grid-No.2 Voltage●●	185		200	volts
From a series resistor of	41500		21500	ohms
DC Grid-No.1 Voltage■	-45		-90	volts
From a grid resistor of	15000		30000	ohms
Peak RF Grid-No.1 Voltage	57		105	volts
DC Plate Current	66		85	ma
DC Grid-No.2 Current	10		7	ma
DC Grid-No.1 Current (Approx.)	3		3	ma
Driving Power (Approx.)	0.17		2	watts
Power Output (Approx.)	27		16.5	watts
Typical IMS° Operation:				
DC Plate Voltage	650			volts
DC Grid-No.2 Voltage●●	200			volts
From a series resistor of	45000			ohms
DC Grid-No.1 Voltage■	-49			volts
From a grid-No.1 resistor of	16300			ohms
Peak RF Grid-No.1 Voltage	68			volts
DC Plate Current	84			ma
DC Grid-No.2 Current	10			ma

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

o,‡,●●,■: See next page.

←Indicates a change.

2E26

2E26

BEAM POWER TUBE

	Up to 125 Mc	
DC Grid-No.1 Current (Approx.) . . .	3	ma
Driver Power (Approx.)	0.2	watt
Power Output (Approx.)	36	watts

Maximum Circuit Values (CCS, ICAS, or IMS Conditions):

Grid-No.1-Circuit Resistance‡ . . .	30000 max.	ohms

→ **CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN**

	Note	Min.	Max.	
Heater Current	1	0.74	0.86	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	-	0.20	μμf
Grid No.1 to cathode & grid No.3, grid No.2, internal shield, base sleeve, and heater	2	10.3	14.7	μμf
Plate to cathode & grid No.3, grid No.2, internal shield base sleeve, and heater .	2	5.3	8.7	μμf
Plate Current.	3	23	47	ma
Grid-No.2 Current	3	-	4	ma
Useful Power Output	4	18	-	watts

Note 1: With 6.3 volts ac on heater.

Note 2: With no external shield.

Note 3: With 6.3 volts ac on heater, dc plate voltage of 200 volts, dc grid-No.2 voltage of 135 volts, and dc grid-No.1 voltage of -10 volts.

Note 4: In a single-tube self-excited oscillator circuit, and with 6.3 volts ac on heater, dc plate voltage of 500 volts, dc grid-No.2 voltage of 200 volts, grid-No.1 resistor of .015 ± 10% megohm, max. dc plate current of 60 ma., dc grid-No.1 current of 1.8 to 2.2 ma., and frequency of 15 Mc.

‡ When grid No.1 is driven positive and the 2E26 is operated at maximum ratings, the total dc grid-No.1-circuit resistance should not exceed the specified value of 30000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100000 ohms.

o Intermittent Mobile Service.

●● Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should be used only when the 2E26 is used in a circuit which is not keyed. Grid-No.2 voltage must not exceed 600 volts under key-up conditions.

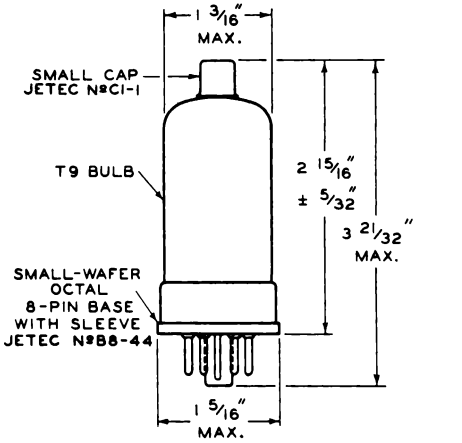
● Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

Data on operating frequencies for the 2E26 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

→ indicates a change

2E26

BEAM POWER TUBE

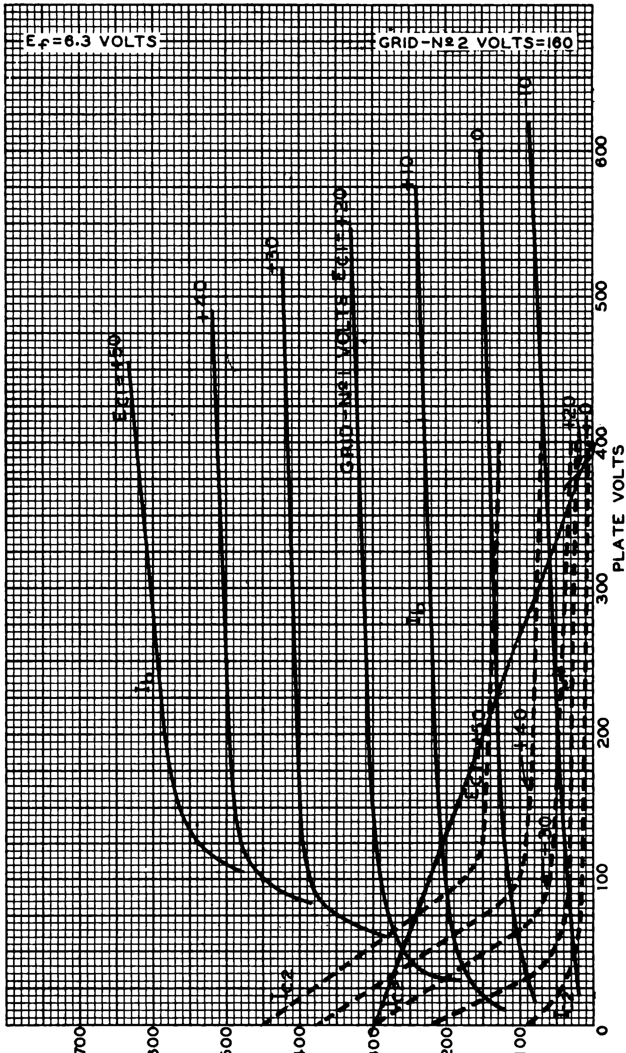


92CS-6607R2

2E26

2E26

AVERAGE PLATE CHARACTERISTICS



NOV. 15, 1945

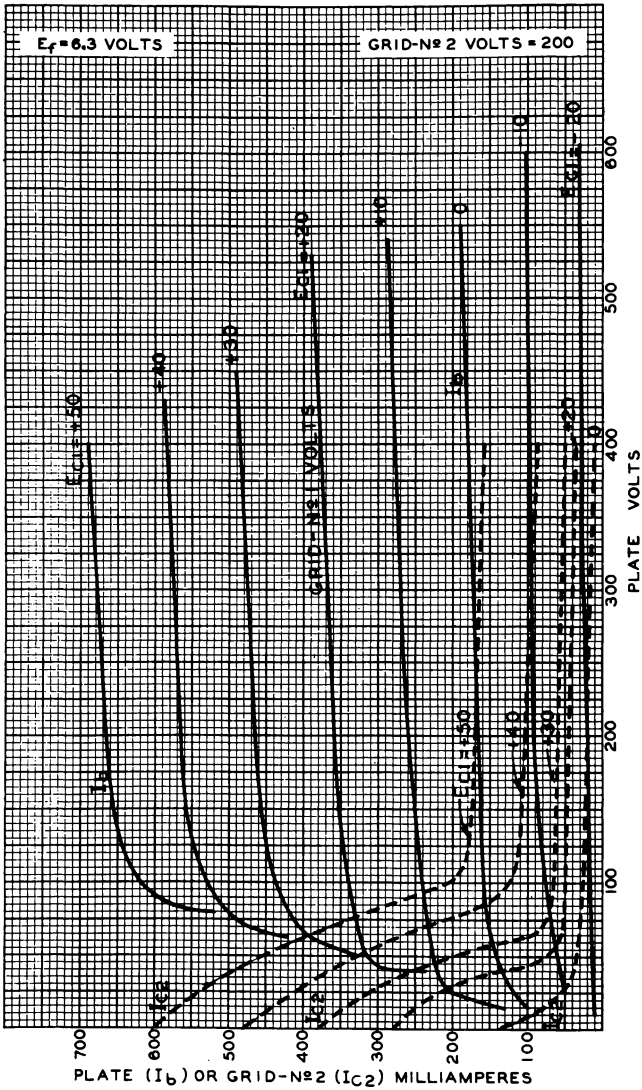
TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

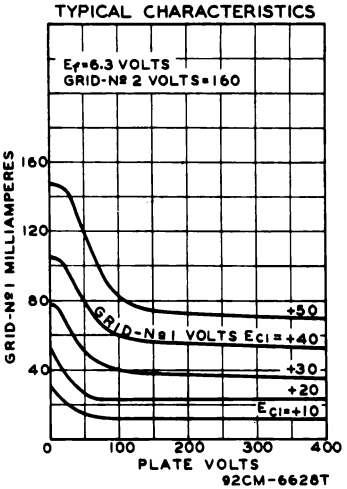
92CM-6631

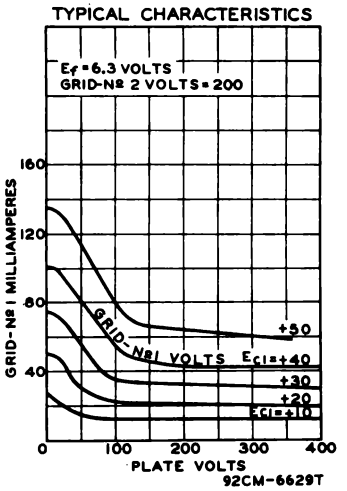
2E26

AVERAGE PLATE CHARACTERISTICS



2E26
BEAM POWER TUBE





4E27A/5-125B
POWER PENTODE

GENERAL DATA

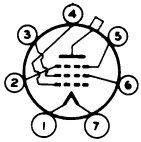
Electrical:

Filament, Thoriated Tungsten:		
Voltage	5.0	ac or dc volts
Current	7.5	amp
Transconductance (Approx.) For plate volts = 2500, grid-No.3 volts = 0, grid-No.2 volts = 500, and plate ma. = 50	2150	μmhos
Mu-Factor, Grid No.2 to Grid No.1	5	
Direct Interelectrode Capacitances:		
Grid No.1 to Plate*	0.08	μμf
Input	10.5	μμf
Output	4.7	μμf

Mechanical:

Mounting Position	Vertical, base down
Overall Length	5-15/16" ± 1/4"
Seated Length	5-3/8" ± 1/4"
Maximum Diameter	2-3/4"
Plate Terminal	See Outline Drawing
Base	Ventilated Medium-Metal-Shell Giant 7-Pin
Basing Designation for BOTTOM VIEW	7BM

Pin 1 - Filament
Pin 2 - Grid No.3
Pin 3 - Grid No.2
Pin 4 - Grid No.1
Pin 5 - Same as Pin 2



Pin 6 - Same as Pin 3
Pin 7 - Filament
Bulb Terminal - Plate

Seal Temperature (Plate and stem)	225 max.	°C
Bulb Temperature (At hottest point)	250 max.	°C

Components:

Socket . . . . . Johnson No.122-237, or equivalent
Heat-Radiating Plate Connector
(Supplied with tube) . . . . . Eimac HR-5

AF POWER AMPLIFIER & MODULATOR--Class B

Maximum CCS° Ratings, *Absolute Values:*

Values are per tube

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	750 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	200 max.	ma
PLATE DISSIPATION	125 max.	watts
GRID-No.3 (SUPPRESSOR) DISSIPATION	20 max.	watts

* With no external shielding and base shell connected to ground.

°: See next page.

4E27A

4E27A/5-125B
POWER PENTODE

GRID-No.2 DISSIPATION.	20 max.	watts
GRID-No.1 DISSIPATION.	5 max.	watts

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS° Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	3200 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	750 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . . .	-500 max.	volts
DC PLATE CURRENT	160 max.	ma
PLATE DISSIPATION.	85 max.	watts
GRID-No.3 (SUPPRESSOR) DISSIPATION	20 max.	watts
GRID-No.2 DISSIPATION.	20 max.	watts
GRID-No.1 DISSIPATION.	5 max.	watts

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy□
and
RF POWER AMPLIFIER--Class C FM Telephony

Maximum CCS° Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	750 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . . .	-500 max.	volts
DC PLATE CURRENT	200 max.	ma
PLATE DISSIPATION.	125 max.	watts
GRID-No.3 (SUPPRESSOR) DISSIPATION	20 max.	watts
GRID-No.2 DISSIPATION.	20 max.	watts
GRID-No.1 DISSIPATION.	5 max.	watts

Typical Operation with Grid No.3 Grounded and Grid-No.2 Volts = 500:

DC Plate Voltage	1000	2000	3000	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 Voltage	-120	-150	-200	volts
Peak RF Grid-No.1 Voltage. . .	170	240	270	volts
DC Plate Current	145	200	167	ma
DC Grid-No.2 Current	17	23	12	ma
DC Grid-No.1 Current (Approx.)	6	11	7	ma
Driving Power (Approx.). . . .	1	2.6	1.9	watts
Power Output (Approx.)	90	275	375	watts

Typical Operation with Grid No.3 Grounded and Grid-No.2 Volts = 750:

DC Plate Voltage	1000	2000	3000	volts
DC Grid-No.2 Voltage	750	750	750	volts

° Continuous commercial service.

□ Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

4E27A/5-125B

POWER PENTODE

DC Grid-No.1 Voltage	-170	-200	-250	volts
Peak RF Grid-No.1 Voltage. . .	205	257	290	volts
DC Plate Current	160	200	167	ma
DC Grid-No.2 Current	21	22	9	ma
DC Grid-No.1 Current (Approx.)	3	6	3	ma
Driving Power (Approx.). . . .	0.6	1.5	0.9	watts
Power Output (Approx.)	115	300	375	watts

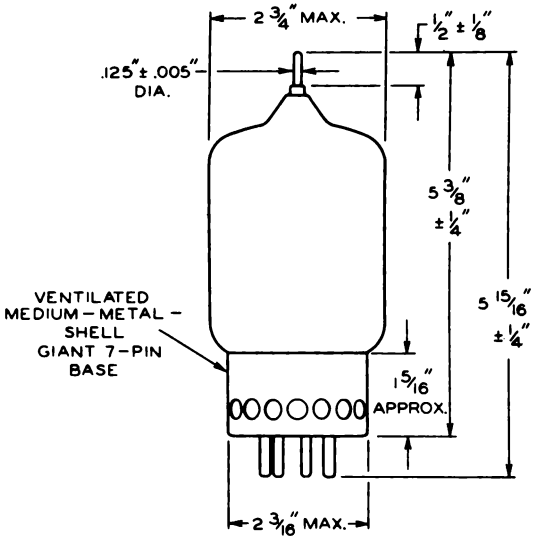
Typical Operation with Grid-No.3 Volts = 60 and Grid-No.2 Volts = 500:

DC Plate Voltage	1000	2000	3000	volts
DC Grid-No.3 Voltage	60	60	60	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 Voltage	-120	-150	-200	volts
Peak RF Grid-No.1 Voltage. . .	170	222	260	volts
DC Plate Current	167	200	167	ma
DC Grid-No.3 Current	6	4	3	ma
DC Grid-No.2 Current	11	11	5	ma
DC Grid-No.1 Current (Approx.)	6	8	6	ma
Driving Power (Approx.). . . .	1	1.8	1.6	watts
Power Output (Approx.)	120	300	375	watts

The 4E27A/5-125B may be operated with maximum rated plate voltage and plate input at frequencies up to 75 megacycles per second

4E27A

4E27A/5-125B
POWER PENTODE

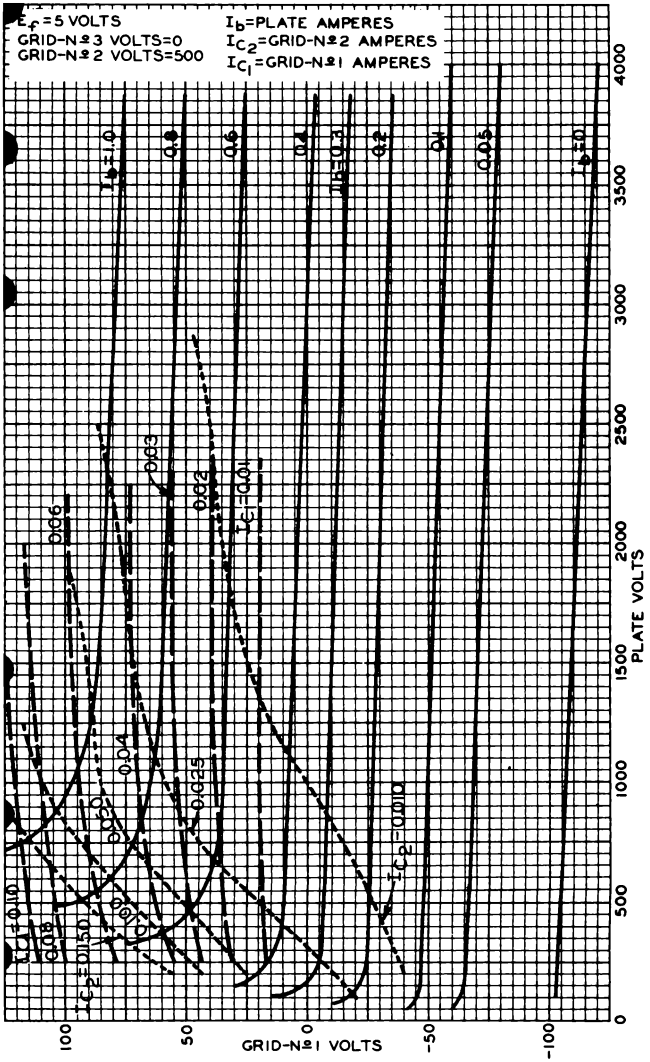


92CS-7437

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

4E27A

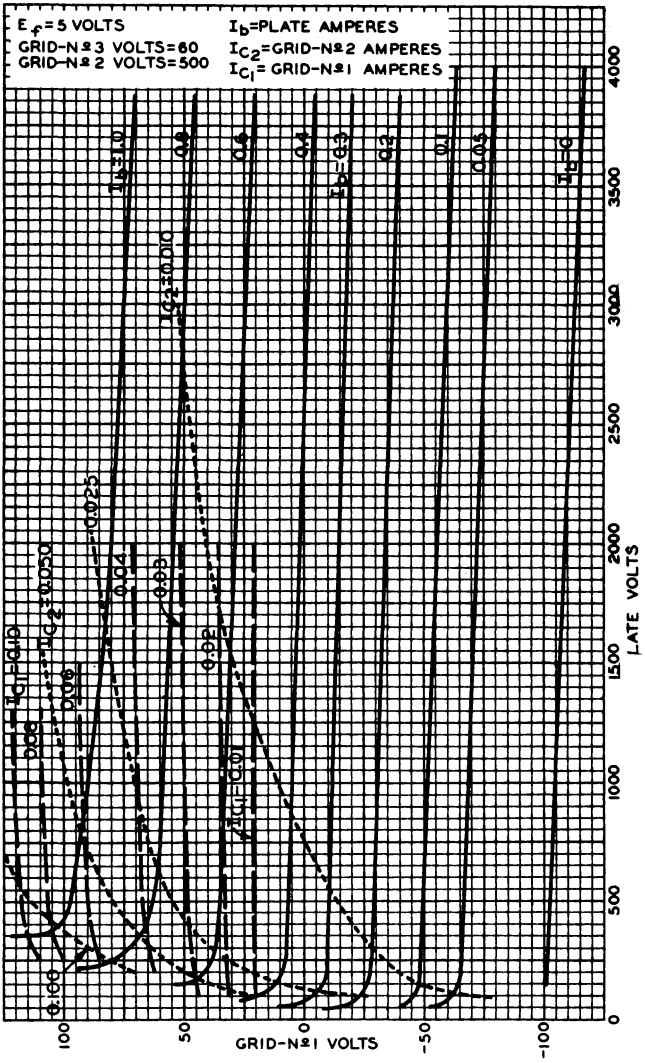
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



4E27A

4E27A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

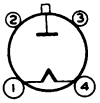


3B25

HALF-WAVE GAS RECTIFIER

HOT-CATHODE TYPE

Filament*	Coated	
Voltage	2.5	a-c volts
Current	5.0	amp.
Tube Voltage Drop (Approx.)	10	volts
Overall Length		5-7/8" ± 7/16"
Seated Height		5-1/4" ± 7/16"
Maximum Diameter		2-1/16"
Bulb		T-16
Cap		Medium
Base		Medium 4-Pin, Bayonet
Pin 1 - Filament		Pin 4 - Filament, Cathode Shield
Pin 2 - No Connection		
Pin 3 - No Connection		Cap - Anode
RCA Socket		Stock No.9919
Mounting Position		Any



BOTTOM VIEW (4P)

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS

Peak Inverse Anode Voltage●	4500 max.	volts ←
Peak Anode Current	2 max.	amp.
Average Anode Current**	0.5 max.	amp.
Surge Anode Current for max. of 0.1 sec.	20 max.	amp.
Ambient Temperature Range	-75 to +90	°C

* Filament voltage must be applied at least 30 seconds before application of anode voltage.

● These ratings apply to the 3B25 when it is operated from a power supply having a frequency up to 500 cycles per second. If a contemplated application involves high supply frequencies, please write, stating the proposed operating frequency, to the attention of the Commerical Engineering Department, Harrison, N.J., as to the required reduction in ratings.

**For an averaging period of 30 seconds.

If the plate return of each tube is not connected to the center-tap of the filament-supply winding, the return should be made to that side of the filament to which the cathode shield is connected.

For *rectifier circuits*, refer to Type 872-A/872.

The table below classifies suitable rectifier circuits for the 3B25 and shows their safe maximum input and maximum output operating conditions for a peak inverse voltage of 4000 volts. The values are based on a sine-wave input and the use of a suitable choke preceding any condenser in the filter circuit.

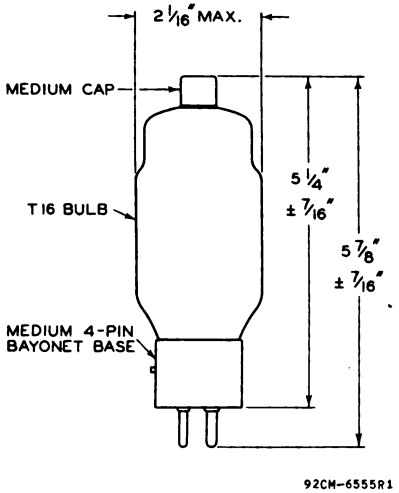
CIRCUIT	MAXIMUM A-C INPUT VOLTS□ (RMS)	APPROX. D-C OUTPUT VOLTS TO FILTER	MAX. D-C OUTPUT CURRENT amperes
SINGLE-PHASE FULL-WAVE (2 tubes) Fig. 1	1400 per tube	1270	1.0
SINGLE-PHASE FULL-WAVE (4 tubes) Fig. 2	2800 total	2540	1.0
THREE-PHASE HALF-WAVE Fig. 3	1630 per leg	1910	1.5
THREE-PHASE DOUBLE-Y PARALLEL Fig. 4	1630 per leg	1910	3.0
THREE-PHASE FULL-WAVE Fig. 5	1630 per leg	3820	1.5

□ For maximum peak inverse voltage of 4000 volts. ← Indicates a change.

3B25

3B25

HALF-WAVE GAS RECTIFIER



3B28

HALF-WAVE GAS RECTIFIER

HOT-CATHODE TYPE

GENERAL DATA

Electrical:

Filament, Coated:		
Voltage	2.5 ± 5%	ac volts
Current at 2.5 volts	5	amp
Minimum Heating Time Before Anode Voltage is Applied	10	seconds
Peak Anode Voltage Drop (Approx.)	10	volts

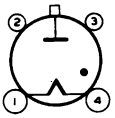
Mechanical:

Mounting Position	Any
Overall Length	5.87" to 6.15"
Seated Length	5.25" to 5.53"
Maximum Diameter	2-1/16"
Bulb	T-16
Cap	Medium (JETEC No.C1-5)
Base	Medium-Shell Small 4-Pin, Bayonet (JETEC No.A4-10)
Basing Designation for BOTTOM VIEW	$4P_1$

Pin 1 - Filament

Pin 2 - No Connection

Pin 3 - No Connection



Pin 4 - Filament, Cathode Shield

Cap - Anode

HALF-WAVE RECTIFIER

Maximum Ratings, *Absolute Values:*

	Rating I	*Rating II*	
PEAK INVERSE ANODE VOLTAGE	5000 max.	10000 max.	volts
ANODE CURRENT:			
Peak	2 max.	1 max.	amp
Average*	0.5 max.	0.25 max.	amp
Fault, for duration of 0.1 second max.	20 max.	20 max.	amp
FREQUENCY OF POWER SUPPLY	500 max.	150 max.	cps
AMBIENT TEMPERATURE	-75 to +90	-75 to +90	°C

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	-	5.40	amp
Critical Anode Voltage	2	-	50	volts
Peak Anode Voltage Drop	3	-	14	volts

Note 1: With 2.5 volts rms on filament.

Note 2: With 2.38 volts rms on filament.

* Averaged over any period of 30 seconds maximum.

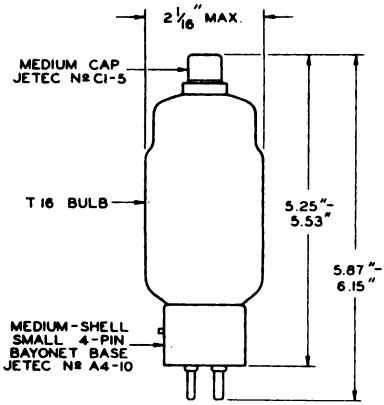
3B28

HALF-WAVE GAS RECTIFIER

Note 3: With 2.5 volts rms on filament, peak anode current of 2 amperes provided by half-cycle pulse from a 60-cps sine wave and recurring approximately once a second. Tube drop is measured by an oscilloscope connected between anode and center tap of filament transformer.

OPERATING NOTES

The filament-supply voltage for the 3B28 may be either in phase or out of phase with the anode voltage. With out-of phase excitation (quadrature operation), improved utilization of the cathode is possible. Although the 3B28 carries no higher anode-current rating for quadrature operation than for in-phase operation, quadrature operation is conducive to appreciably longer tube life. For optimum results, the filament and anode voltages should be 90° out of phase. In practical applications however, nearly, full realization of the advantages of this type of excitation is possible even when the phase difference between the filament and anode supply voltages ranges from the optimum value by as much as ± 30°. In polyphase operation where the anode voltage shifts from one phase to another during the current-conduction period, quadrature operation is obtained when the filament voltage passes through zero at the center of the current-conduction period.



92CM-7642

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

3B28

HALF-WAVE GAS RECTIFIER

For Circuit Figures, see Front of this Section

CIRCUIT	MAX. TRANS. SEC. VOLTS (RMS) E	APPROX. DC OUTPUT VOLTS TO FILTER E_{av}	MAX. DC OUTPUT AMPERES I_{av}		MAX. DC OUTPUT KW TO FILTER P_{dc}	
Fig. 1 **Half-Wave** **Single-Phase** In-Phase Operation	7000▲	3200	0.25		0.8	
	3500●	1600	0.5		0.8	
Fig. 2 **Full-Wave** **Single-Phase** In-Phase Operation	3500▲	3200	0.5		1.6	
	1700●	1600	1.0		1.6	
Fig. 3 **Series** **Single-Phase** In-Phase Operation	7000▲	6400	0.5		3.2	
	3500●	3200	1.0		3.2	
Fig. 4 **Half-Wave** **Three-Phase** In-Phase Operation	4000▲	4800	0.75		3.6	
	2000●	2400	1.5		3.6	
Fig. 5 **Parallel** **Three-Phase** Quadrature Operation	4000▲	4800	1.5		7.2	
	2000●	2400	3.0		7.2	
Fig. 6 **Series** **Three-Phase** Quadrature Operation	4000▲	9600	0.75		7.2	
	2000●	4800	1.5		7.2	
Fig. 7 **Half-Wave** **Four-Phase** Quadrature Operation			*Resistive Load*	*Inductive Load*	*Resistive Load*	*Inductive Load*
	3500▲	4500	0.9	1.0	4.0	4.5
	1700●	2250	1.8	2.0	4.0	4.5
Fig. 8 **Half-Wave** **Six-Phase** Quadrature Operation			*Resistive Load*	*Inductive Load*	*Resistive Load*	*Inductive Load*
	3500▲	4800	0.95	1.0	4.5	4.8
	1700●	2400	1.9	2.0	4.5	4.8

▲ For maximum peak inverse anode voltage of 10000 volts.
● For maximum peak inverse anode voltage of 5000 volts.

3C33

TWIN-TRIODE POWER AMPLIFIER

GENERAL DATA

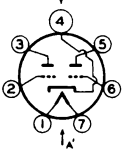
Electrical:

Heater, for Unipotential Cathode:		
Voltage	12.6 ± 10%	ac or dc volts
Current	1.125	amp
Amplification Factor, (per unit)	11	
Direct Interelectrode Capacitances (per unit):		
Grid to Plate	5	μμf
Grid to Cathode	8.5	μμf
Plate to Cathode	4	μμf

Mechanical:

Mounting Position	Vertical, base up or down; Horizontal, with plane of each plate vertical
Overall Length	3-1/2" ± 3/16"
Seated Length	3-1/16" ± 3/16"
Maximum Diameter	See Outline Drawing
Bulb	T-16
Base	Medium Molded-Flare Septar 7-Pin
Basing Designation for BOTTOM VIEW	7CG

Pin 1 - Heater
Pin 2 - Grid of Unit No.2
Pin 3 - Plate of Unit No.2
Pin 4 - Cathode



Pin 5 - Plate of Unit No.1
Pin 6 - Grid of Unit No.1
Pin 7 - Heater

PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

CONTROL AMPLIFIER SERVICE

Values are for each unit unless otherwise specified

Maximum Ratings, *Absolute Values*:

PEAK PLATE VOLTAGE	± 2000 max.	volts
DC GRID VOLTAGE	-200 max.	volts
PEAK CATHODE CURRENT	500 max.	ma.
AVERAGE PLATE CURRENT	120 max.	ma.
AVERAGE GRID CURRENT	7.5 max.	ma.
PLATE DISSIPATION	15 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

Typical Operation in Accompanying Circuit:

Plate-Supply Voltage (E_{RMS})*	600	volts
DC Grid-Supply Voltage (E_{CC})	-160	volts

* See next page.

3C33

TWIN-TRIODE POWER AMPLIFIER

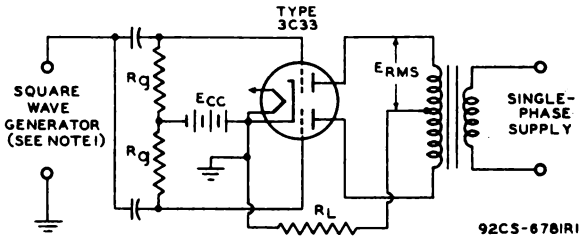
Peak Grid Voltage (See Note 1)	160	volts
Grid-Circuit Resistance (R_g)	0.5	megohm
Load Resistance (R_L)	3000	ohms
Peak Output Current°	210	ma.

Maximum Circuit Values:

Grid-Circuit Resistance:		
→ When grid potential is always negative.	0.5	megohm
When grid potential swings positive	0.03	megohm

* Plates are operated 180° out of phase.

° Output-current wave-shape is essentially that of a half-sine wave.

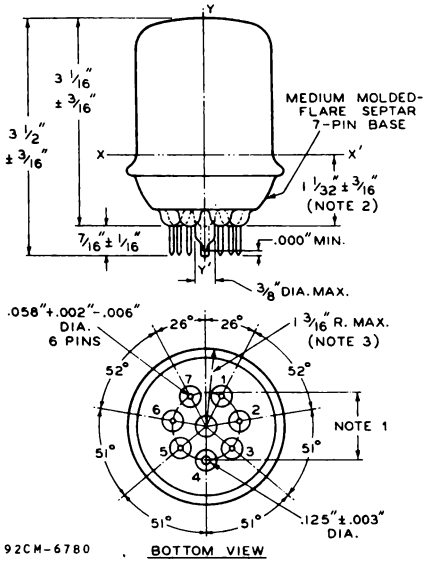


NOTE 1: VOLTAGE DELIVERED BY SQUARE-WAVE GENERATOR TO THE PARALLELED GRIDS SHOULD BE IN PHASE WITH THE PLATE VOLTAGE ON ONE OF THE UNITS TO PERMIT CONDUCTION THROUGH THAT UNIT WITH RESULTANT CURRENT FLOW THROUGH R_L, AND SHOULD BE REVERSIBLE IN PHASE TO PERMIT CONDUCTION THROUGH THE OTHER UNIT WITH RESULTANT CURRENT FLOW THROUGH R_L.

Devices and arrangements shown or described herein may use patents of RCA or others. Information contained herein is furnished without responsibility by RCA for its use and without prejudice to RCA's patent rights.

→ Indicates a change.

3C33
TWIN-TRIODE POWER AMPLIFIER



THE REFERENCE AXIS YY' IS DEFINED AS THE AXIS OF THE BASE-PIN GAUGE DESCRIBED IN NOTE 1.

NOTE 1: ANGULAR VARIATIONS BETWEEN PINS AND VARIATION IN PIN-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT PINS WILL ENTER TO A DISTANCE OF 0.375" A FLAT-PLATE BASE-PIN GAUGE HAVING SIX HOLES 0.0800" ± 0.0005" AND ONE HOLE 0.1450" ± 0.0005" ARRANGED ON A 1.0000" ± 0.0005" CIRCLE AT SPECIFIED ANGLES WITH TOLERANCE OF ±5' FOR EACH ANGLE. GAUGE IS ALSO PROVIDED WITH A HOLE 0.500" ± 0.010" CONCENTRIC WITH PIN CIRCLE WHOSE CENTER IS ON THE AXIS YY'.

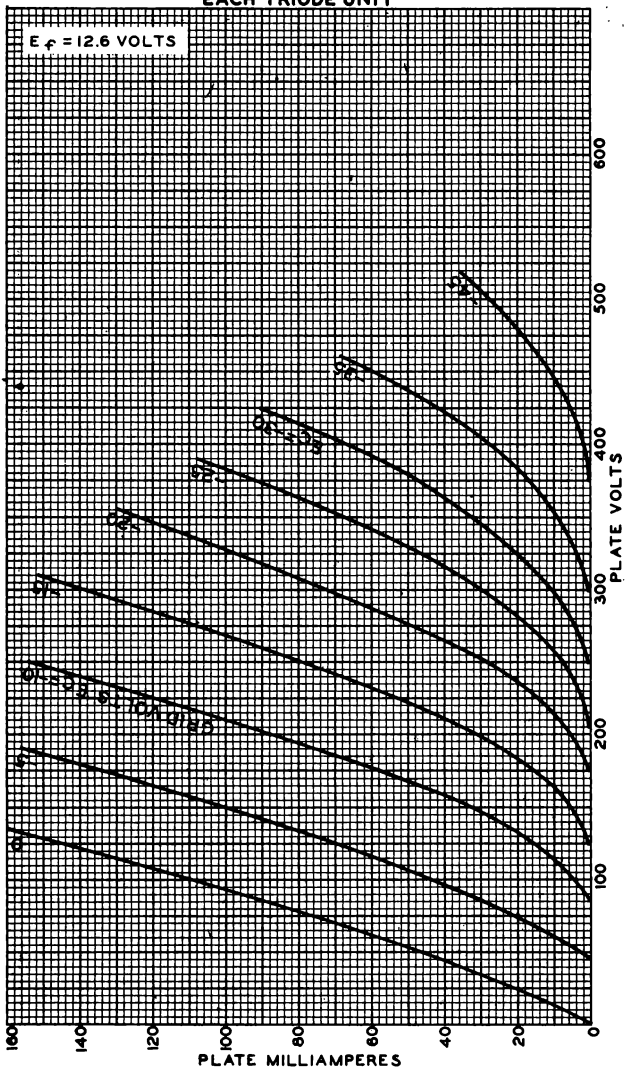
NOTE 2: A FLAT-PLATE FLANGE GAUGE WITH HOLE 2.063" - 0.000" + 0.003" IS LOWERED OVER TUBE SEATED IN BASE-PIN GAUGE SO THAT THE HOLE AXIS IS COINCIDENT WITH AXIS YY' WITHIN 0.150", AND SO THAT THE BOTTOM SURFACE OF THE FLANGE GAUGE IS PARALLEL TO THE TOP SURFACE OF THE BASE-PIN GAUGE, AND UNTIL THE FLANGE GAUGE RESTS ON THE TUBE-FLANGE SEAL AT POSITION XX'. THE PERPENDICULAR DISTANCE BETWEEN THE TWO GAUGES WILL BE AS SHOWN.

NOTE 3: MINIMUM DIAMETER OF TUBE-SEAL FLANGE WILL BE SUCH THAT A RING GAUGE HAVING AN INSIDE DIAMETER OF 2.125" - 0.000" + 0.003" AND THICKNESS OF 0.125" ± 0.010" WILL NOT PASS THE FLANGE WHEN TRIED AT ANY ANGLE.

3C33

3C33

AVERAGE PLATE CHARACTERISTICS
EACH TRIODE UNIT



JULY 5, 1946

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6779

3E22

PUSH-PULL H-F BEAM POWER AMPLIFIER

Unless otherwise specified, values are for both units

GENERAL DATA

Electrical:

Heaters, for Unipotential Cathodes.

	Series	*Parallel*	
Arrangement . .			
Voltage	12.6 ± 10%	6.3 ± 10%	ac or dc volts ←
Current	0.8	1.6	. . . . . amp

Transconductance, for plate current of 25 ma . . 4000 . . . . . µmhos

Grid-Screen Mu-Factor . . 6.5

Direct Interelectrode Capacitances (Each Unit):*

Grid No.1 to Plate. . .	0.22 max.	. . . . . µµf
Input	14	. . . . . µµf
Output.	8.5	. . . . . µµf

Mechanical:

Mounting Position . . . . . Vertical, base up or down; or Horizontal, plane of plates vertical

Overall Length. . . . . 4-3/8" ± 3/16"

Seated Length . . . . . 3-13/16" ± 3/16"

Maximum Diameter. . . . . 2-3/8"

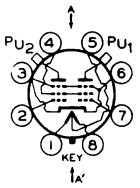
Bulb. T-16

Caps (Two). . . . . Small

Base. . . Large Wafer Octal 8-Pin Micanol with Sleeve No.T253 ←

Basing Designation for BOTTOM VIEW. 8BY

Pin 1 - Heater
Pin 2 - Grid No.1 of Unit No.2
Pin 3 - Cathode, Grid No.3, Internal Shield
Pin 4 - Grid No.2
Pin 5 - Heater Center-Tap



PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

Pin 6 - Cathode, Grid No.3, Internal Shield ←
Pin 7 - Grid No.1 of Unit No.1 ←
Pin 8 - Heater
PU_1 - Plate of Unit No.1
PU_2 - Plate of Unit No.2

PLATE-MODULATED PUSH-PULL RF POWER AMP. — Class C Telephony

Carrier conditions per tube for use with a maximum average modulation factor of 0.25

Maximum Ratings, *Absolute Values*:

	IMS●
DC PLATE VOLTAGE.	560 max. volts
DC GRID-No.2 (SCREEN) VOLTAGE	225 max. volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-175 max. volts
DC PLATE CURRENT.	160 max. ma.
DC GRID-No.1 CURRENT.	11 max. ma.
PLATE INPUT	90 max. watts

*,●, See next page. ← Indicates a change.

3E22

3E22

PUSH-PULL H-F BEAM POWER AMPLIFIER

GRID-No.2 INPUT	6 max.	watts
PLATE DISSIPATION	30 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
Typical Operation:		
DC Plate Voltage	560	volts
DC Grid-No.2 Voltage□	200	volts
	18000	ohms
DC Grid-No.1 Voltage Δ	-50	volts
	7700	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage	130	volts
DC Plate Current	160	ma.
DC Grid-No.2 Current	20	ma.
DC Grid-No.1 Current (Approx.)	6.5	ma.
Driving Power (Approx.) ●	0.4	watt
Power Output (Approx.)	67	watts
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance§	30000 max.	ohms

PUSH-PULL RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

Maximum Ratings, *Absolute Values*:

	INS●	
DC PLATE VOLTAGE	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	225 max.	volts
DC GRID-No.1 (CONTROL GRID) VOLTAGE	-175 max.	volts
DC PLATE CURRENT	175 max.	ma.
DC GRID-No.1 CURRENT	11 max.	ma.
PLATE INPUT	100 max.	watts
GRID-No.2 INPUT	6 max.	watts
PLATE DISSIPATION	35 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
Typical Operation:		
DC Plate Voltage	600	volts
DC Grid-No.2 Voltage⊕	200	volts
	20000	ohms
DC Grid-No.1 Voltage ‡	-55	volts
	7850	ohms
	295	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage	140	volts
DC Plate Current	160	ma.
DC Grid-No.2 Current	20	ma.
DC Grid-No.1 Current (Approx.)	7	ma.

*,●,□,Δ,#,⊕,‡,§: See next page.

3E22

PUSH-PULL H-F BEAM POWER AMPLIFIER

Driving Power (Approx.)	0.45	. . watt
Power Output (Approx.)	72	. . watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance§.	30000 max.	ohms

● Intermittent Mobile Service (IMS) is defined to include those applications, such as aircraft, where the transmitter design factors of minimum size, light weight, and exceedingly high power output for short intervals are the primary requirements, even though the average life expectancy of tubes used in such transmitters is reduced to about 100 hours.

Tube ratings for IMS service are established on the basis that the transmissions have maximum "on" periods of 15 seconds followed by "off" periods of at least 60 seconds, except that it is permissible to make equipment tests with maximum "on" periods of 5 minutes followed by off periods of at least 5 minutes provided the total "on" time of such periods does not exceed 10 hours during the life of any tube.

Although the use of tubes under IMS ratings involves great reduction in tube life, such use can be justified as economical practice in applications where high power is intermittently desired from small tubes.

* With no external shielding.

□ Obtained preferably from a separate source modulated with the plate supply or from the modulated plate-supply through a series resistor of the value shown.

Δ Obtained from grid-resistor of value shown or by partial self-bias methods.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of carrier conditions.

⊕ Obtained preferably from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown. The grid-No.2 voltage must not exceed 600 volts under key-up conditions.

‡ Obtained from fixed-supply, by grid resistor of value shown, or cathode resistor of value shown, respectively.

§ Any additional bias required must be supplied by a cathode resistor or a fixed supply.

OUTLINE DIMENSIONS AND CURVES for the 3E22 are the same as those for the 815.

3E29

TWIN-UNIT BEAM POWER TUBE

Unless Otherwise Specified, Values are on a Per Tube Basis

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

	Parallel	*Series*	
Arrangement			
Voltage (AC or DC)	6.3 +10% −5%	12.6 +10% −5%	volts
Current at 6.3 volts	2.25	–	amp
Current at 12.6 volts	–	1.125	amp

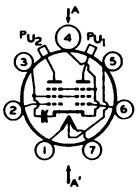
Transconductance (Each Unit): With plate volts = 250, grid-No.2 volts = 175, and plate ma. = 60	8500	μmhos
Mu-Factor, Grid No.2 to Grid No.1 (Each Unit): With plate volts = 225, grid-No.2 volts = 225, and plate ma. = 60	9	
Direct Interelectrode Capacitances (Each Unit):		
Grid No.1 to plate (with external shield□). . . .	0.12 max.	μμf
Input	14	μμf
Output	7	μμf

Mechanical:

Mounting Position	Vertical, base up or down; Horizontal, plane of each plate vertical
Overall Length	4-1/8" ± 3/16"
Seated Length	3-11/16" ± 3/16"
Maximum Diameter	2-3/8"
Bulb	T-16
Bulb Terminals (Two)	See Dimensional Outline
Weight (Approx.)	3.5 oz.
Base	Medium Molded-Flare Septar 7-Pin (JETEC No.E7-2)

BOTTOM VIEW

Pin 1 – Heater
Pin 2 – Grid No.1 of Unit No.2
Pin 3 – Grid No.2 of Both Units
Pin 4 – Cathode, Grid No.3 of Both Units
Pin 5 – Heater Center-Tap



Pin 6 – Grid No.1 of Unit No.1
Pin 7 – Heater

P_{U1} – Plate Terminal of Unit No.1
P_{U2} – Plate Terminal of Unit No.2

PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

□: See next page.

← Indicates a change

3E29

TWIN-UNIT BEAM POWER TUBE

→ **MODULATOR—Rectangular-Wave Modulation**

Values are for Units in Parallel

Maximum CCS● Ratings, *Absolute Values:*

For Duty Factor between 0.0001 and 1.0 and Maximum Averaging Time of 1200 µsec in Any Interval*

DC PLATE SUPPLY VOLTAGE▲	5000 max.	volts
INSTANTANEOUS PLATE VOLTAGE	5750 max.	volts
DC GRID-No.2 (SCREEN) SUPPLY VOLTAGE▲	850 max.	volts
DC GRID-No.1 (CONTROL-GRID) SUPPLY VOLTAGE▲	-225 max.	volts
INSTANTANEOUS GRID-No.1 VOLTAGE	-600 max.	volts
PEAK POSITIVE GRID-No.1 VOLTAGE	250 max.	volts
PEAK PLATE CURRENT	See Rating Chart	
PEAK GRID-No.2 CURRENT	3.5 max.	amp
PEAK GRID-No.1 CURRENT	4 max.	amp
PLATE INPUT	85 max.	watts
GRID-No.2 INPUT	3 max.	watts
GRID-No.1 INPUT	1 max.	watt
PLATE DISSIPATION#	15 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

Typical Operation with Rectangular-Wave Shapes in Accompanying Test Circuit:

With Duty Factor of*	*0.002*	*0.001*	
DC Plate Supply Voltage	2000	5000	volts
DC Grid-No.2 Supply Voltage	650	850	volts
DC Grid-No.1 Supply Voltage	-175	-200	volts
Peak Positive Grid-No.1 Voltage	50	150	volts

□ Having length of 3/4" and inside diameter of 2-3/8". Shield is placed around base end of tube and is connected to cathode.

● Continuous Commercial Service.

▲ For tube protection, it is essential that sufficient dc resistance be used in the plate supply circuit, the grid-No.2 supply circuit, and the grid-No.1 supply circuit so that the short-circuit current is limited to 0.5 ampere in each circuit.

* *Duty Factor* for the 3E29 is defined as the "on" time in microseconds divided by 1200 microseconds.

"On" Time is defined as the sum of the durations of all the individual pulses which occur during any 1200-microsecond interval.

Pulse Duration is defined as the time interval between the two points on the pulse at which the instantaneous value is 70% of the peak value. The peak value is defined as the maximum value of a smooth curve through the average of the fluctuations over the top portion of the pulse.

\# Averaged over any interval not exceeding 1200 microseconds. Care should be used in determining the plate dissipation. A calculated value based on rectangular pulses can be considerably in error when the actual pulses have a finite rise and fall time. Plate dissipation should preferably be determined by measuring the bulb temperature under actual operating conditions; then, with the tube in the same socket and under the same ambient-temperature conditions, apply to the tube sufficient dc input to obtain the same bulb temperature. This value of dc input is a measure of the plate dissipation.

→ Indicates a change

3E29

TWIN-UNIT BEAM POWER TUBE

Plate Current:			
Peak	5	10	amp
DC	0.010	0.010	amp
DC Grid-No.2 Current	0.0011	0.002	amp
DC Grid-No.1 Current	0.001	0.001	amp
Load Resistance	300	400	ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN ←

	Note	*Min.*	*Max.*	
Heater Current (Parallel Connection)	1	2.00	2.50	amp
Heater Current (Series Connection)	2	1.00	1.25	amp
Grid-No.1-to-Plate Capacitance (Each unit)	3	-	0.12	μμf
Input Capacitance (Each unit)	-	12.8	16.2	μμf
Output Capacitance (Each unit)	-	5.25	8.75	μμf
Plate Current (Each unit)	1,4	38	82	ma
Grid-No.1 Voltage	1,5	-	-55	volts
Grid-No.2 Current (Each unit)	1,4	-	10	ma
Peak Plate Current	1,6	9	-	amp

Note 1: With 6.3 volts on heater.

Note 2: With 12.6 volts on heater.

Note 3: With external shield having length of 3/4" and inside diameter of 2-3/8". Shield is placed around base end of tube and is connected to cathode.

Note 4: With dc plate voltage of 250 volts, dc grid-No.2 voltage of 175 volts, and dc grid-No.1 voltage of -11 volts. Grid No.1 of unit not under test is biased -100 volts with respect to its cathode.

Note 5: With units in parallel, dc plate voltage of 400 volts, dc grid-No.2 voltage of 225 volts, and dc grid-No.1 voltage adjusted to give dc plate current of 200 microamperes.

Note 6: With the units in parallel in the accompanying test circuit under the following conditions: rectangular-wave modulation applied to grid No.1; pulse duration of 1 microsecond approx.; pulse repetition rate of 1500 cps approx.; dc plate-supply voltage of 5000 volts; dc grid-No.2 voltage of 850 volts; dc grid-No.1 volts of -200 volts; peak positive grid-No.1 swing of 150 volts; and dc plate current of 15 ma. minimum obtained by adjusting the pulse repetition rate.

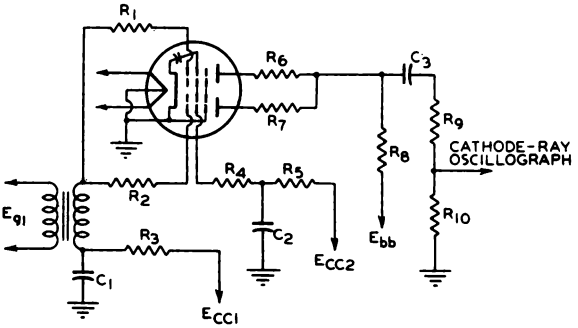
DIMENSIONAL OUTLINE for the 3E29
is the same as that shown for type 829-B

← Indicates a change

3E29

TWIN-UNIT BEAM POWER TUBE

TEST CIRCUIT



R1 R2: 20 ohms, 1 watt non-inductive

R3: 15000 ohms, 1 watt

R4: 25 ohms, 1 watt, non-inductive

R5: 10000 ohms, 1 watt

R6 R7: 10 ohms, 5 watts, non-inductive

R8: 10000 ohms, 50 watts

R9: 400 ± 5% ohms, 50 watts non-inductive

R10: 10 ± 1% ohms, 5 watts

C1: 0.1 μf, 600 v dc

C2: 0.1 μf, 1000 v dc

C3: 0.1 μf, 5000 v dc

Ecc1: Grid-No.1 Supply Voltage

Ecc2: Grid-No.2 Supply Voltage

Ebb: Plate Supply Voltage

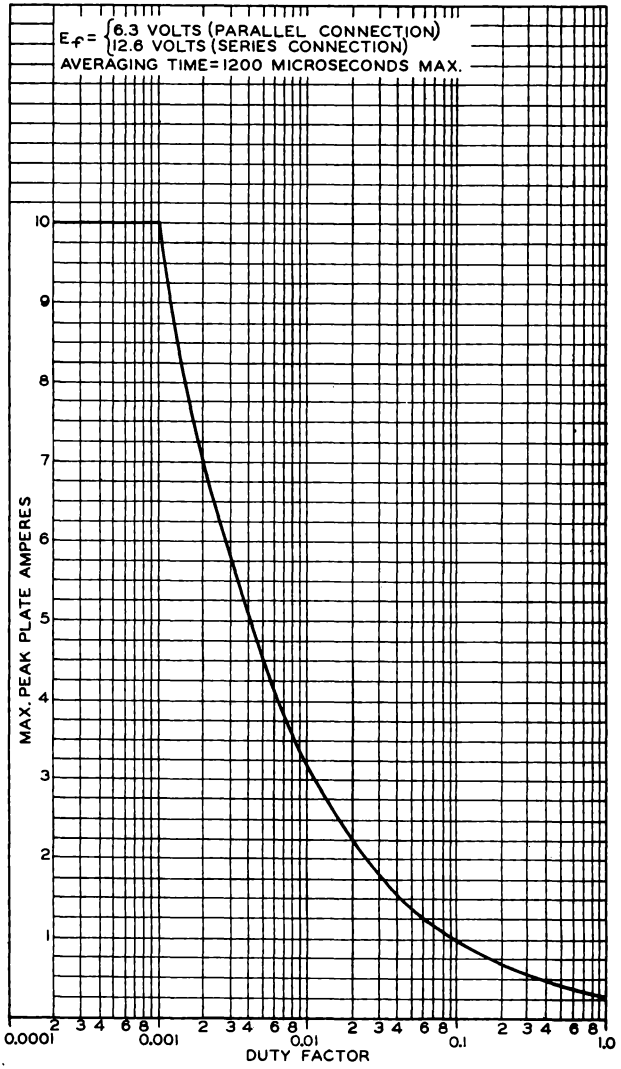
Eg1: Signal Voltage

92CS-6542R1

Devices and arrangements shown or described herein may use patents of RCA or others. Information contained herein is furnished without responsibility by RCA for its use and without prejudice to RCA's patent rights.

3E29

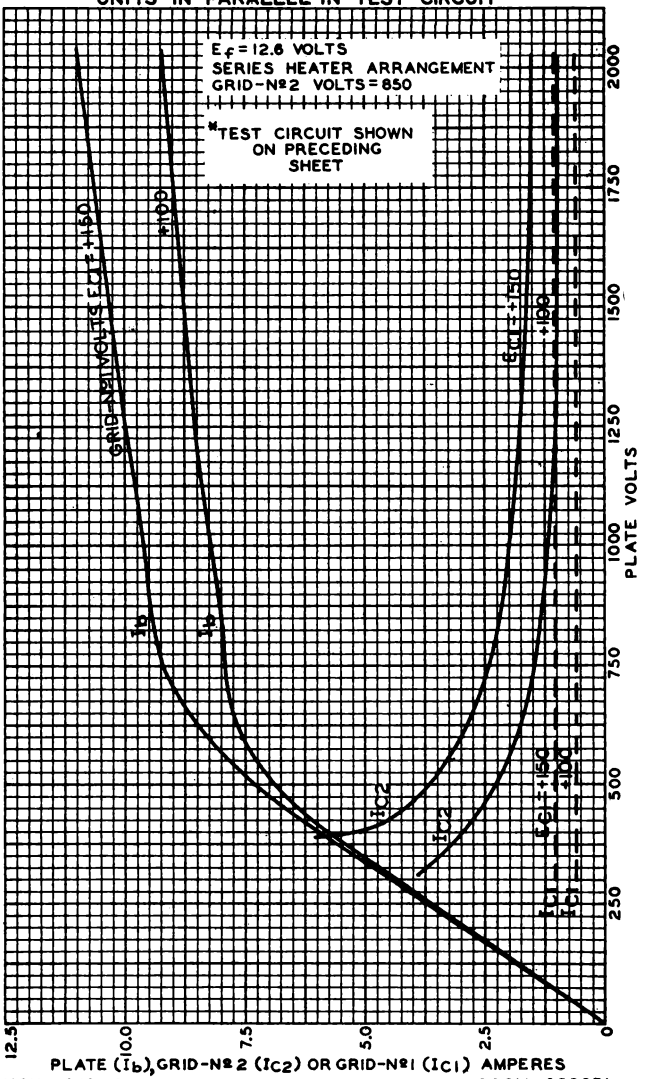
RATING CHART



3E29

AVERAGE CHARACTERISTICS

UNITS IN PARALLEL IN TEST CIRCUIT*



NOV. 25, 1946 TUBE DIVISION 92CM-6530R1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

4-65A

VHF POWER TETRODE

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:			
Voltage	6.0		ac or dc volts
Current	3.5		amp
Mu-Factor, Grid No.2 to Grid No.1	5		
Direct Interelectrode Capacitances:[o]			
Grid No.1 to Plate	0.12 max.		μμf
Input	8		μμf
Output	2.1		μμf

o With no external shield.

Mechanical:

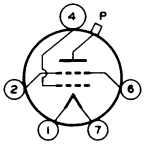
Mounting Position	Vertical, base down or up
Overall Length	4-3/16" ± 3/16"
Seated Length	3-11/16" ± 3/16"
Maximum Diameter	2-3/8"
Bulb	T-16
Cap ♦	Skirted Small
Base	Medium-Molded-Flare Septar 5 Pin

Basing Designation for BOTTOM VIEW

Pin 1 - Filament

Pin 2 - Grid No.2

Pin 4 - Grid No.1



Pin 6 - Grid No.2

Pin 7 - Filament

Cap - Plate

Bulb and Seal Temperatures:

Continuous Service-- . . . . . 200 max. °C

Adequate ventilation around the tube must be provided to prevent the temperature of the bulb and seals from exceeding the specified maximum value.

Intermittent Service ("on" period does not exceed 5 minutes and is followed by "off" period of the same or greater duration — . . . 220 max. °C

When ambient temperature does not exceed 30°C and the operating frequency is below 50Mc, it will not usually be necessary to provide forced-air cooling of the bulb and seals to prevent exceeding the specified maximum temperature value provided a heat-radiating plate connector is used and adequate ventilation is provided.

Components:

Socket	Johnson No.122-101, or equivalent
Heat-Radiating Plate Connector	Eimac HR-6, or equivalent

♦ A flexible lead should be used in making connection to the plate.

4-65A

VHF POWER TETRODE

PUSH-PULL AF POWER AMPLIFIER & MODULATOR — Class AB_1*

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT**	150 max.	ma
MAX.-SIGNAL GRID-No.2 DISSIPATION**	10 max.	watts
PLATE DISSIPATION**	65 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1000	1500	1750	volts
DC Grid-No.2 Voltage■	500	500	500	volts
DC Grid-No.1 (Control-Grid) Voltage▲	-85	-85	-90	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	170	170	180	volts
Zero-Signal DC Plate Current	30	30	20	ma
Max.-Signal DC Plate Current	170	180	170	ma
Zero-Signal DC Grid-No.2 Cur.	0	0	0	ma
Max.-Signal DC Grid-No.2 Cur.	24	14	17	ma
Effective Load Resistance (Plate to plate)	9000	15000	20000	ohms
Max.-Signal Driving Power (Approx.)	0	0	0	watts
Max.-Signal Power Output (Approx.)	80	145	175	watts

Maximum Circuit Values:

Effective Grid-No.1-Circuit Resistance	250000 max.	ohms

PUSH-PULL AF POWER AMPLIFIER & MODULATOR — Class AB_2†

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT**	150 max.	ma
MAX.-SIGNAL DC GRID-No.2 DISSIPATION**	10 max.	watts
PLATE DISSIPATION**	65 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	600	1000	1500	1800	volts

* Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

■ Obtained from a source having good regulation.

▲ Adjusted to give indicated value of zero-signal plate current.

† Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

** Averaged over any audio-frequency cycle of sine-wave form.

●: See next page.

4-65A

VHF POWER TETRODE

DC Grid-No.2 Voltage	250	250	250	250	volts
DC Grid-No.1 (Control-Grid) Voltage:▲▲ From fixed supply of	-30	-30	-35	-35	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage . .	240	210	200	180	volts
Zero-Signal DC Plate Current .	60	60	60	50	ma
Max.-Signal DC Plate Current .	300	300	250	220	ma
Zero-Signal DC Grid-No.2 Cur.	0	0	0	0	ma
Max.-Signal DC Grid-No.2 Cur.	60	45	30	25	ma
Effective Load Resistance (Plate to plate) .	3600	6800	14000	20000	ohms
Max.-Signal Av. Driving Power (Approx.). .	3.1	2.5	1.6	1.1	watts
Max.-Signal Peak Driving Power (Approx.)o .	6.2	5	3.2	2.2	watts
Max.-Signal Power Output (Approx.). .	90	170	250	270	watts

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	2500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . . .	-500 max.	volts
DC PLATE CURRENT	120 max.	ma
PLATE DISSIPATION.	45 max.	watts
GRID-No.2 DISSIPATION.	10 max.	watts
GRID-No.1 DISSIPATION.	5 max.	watts

Typical Operation:

DC Plate Voltage	600	1000	1500	2000	2500	volts
DC Grid-No.2 Voltage○○ . . .	250	250	250	250	250	volts
DC Grid-No.1 Voltage ⊕ . . .	-100	-110	-125	-125	-150	volts
Peak AF Grid-No.2 Volt.○○. .	175	175	175	175	175	volts
Peak AF Grid-No.1 Volt. . .	190	210	225	225	235	volts
DC Plate Current	117	120	120	120	108	ma

▲▲ Adjusted to give indicated value of zero-signal plate current. The dc resistance of the bias source should not exceed 250 ohms.

o The driver stage should be capable of supplying the No.1 grids of the class AB_2 stage with the specified driving power at low distortion. The effective resistance per grid-No.1 circuit of the class AB_2 stage should be held at a low value.

○○ Modulation voltage for grid No.2 is obtained by supplying the dc grid-No.2 voltage from the unmodulated plate supply through a series dropping resistor, or by the use of an af reactor in the positive grid-No.2 supply lead, or from a separate winding on the modulation transformer. With either the series-resistor or the reactor method, the af variations in grid-No.2 current resulting from variations in plate voltage as the plate is modulated automatically produce the grid-No.2 modulation voltage.

⊕ The use of bias obtained partially from a grid resistor is recommended.

●: See next page.

4-65A

VHF POWER TETRODE

DC Grid-No.2 Current . .	40	40	35	33	16	ma
DC Grid-No.1 Current (Approx.)	11	12	12	12	8	ma
Driving Power (Approx.).	2.1	2.5	2.7	2.6	1.9	watts
Power Output (Approx.) .	50	95	145	200	225	watts

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy#
and
RF POWER AMPLIFIER--Class C FM Telephony

Maximum CCS● Ratings, ***Absolute Values*****:**

DC PLATE VOLTAGE	3000	max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	400	max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . .	-500	max.	volts
DC PLATE CURRENT	150	max.	ma
PLATE DISSIPATION.	65	max.	watts
GRID-No.2 DISSIPATION.	10	max.	watts
GRID-No.1 DISSIPATION.	5	max.	watts

Typical Operation:

DC Plate Voltage	600	1000	1500	2000	3000	volts
DC Grid-No.2 Voltage . .	250	250	250	250	250	volts
DC Grid-No.1 Voltage . .	-50	-70	-75	-80	-90	volts
Peak RF Grid-No.1 Volt.	145	170	180	175	170	volts
DC Plate Current	140	150	150	150	115	ma
DC Grid-No.2 Current . .	40	40	35	30	20	ma
DC Grid-No.1 Current . . (Approx.).	13	15	14	12	10	ma
Driving Power (Approx.).	1.9	2.5	2.5	2.1	1.7	watts
Power Output (Approx.) .	54	105	170	235	280	watts

Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

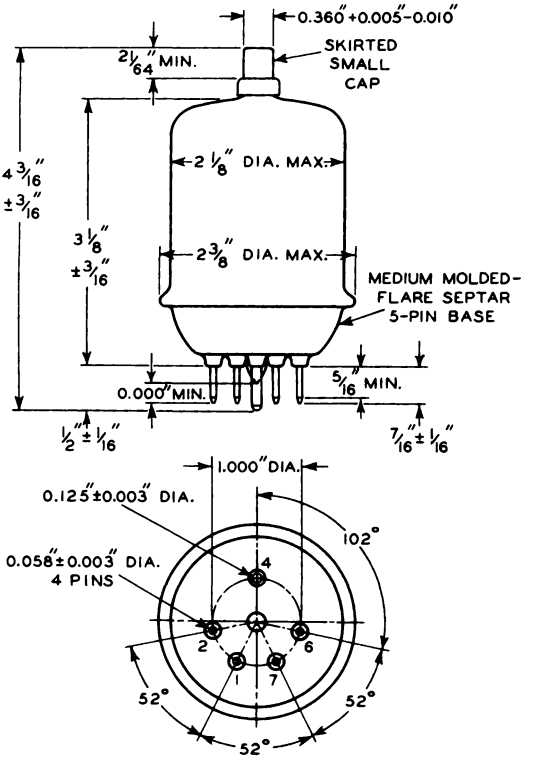
When the 4-65A is used in the final amplifier or a preceeding stage of a transmitter designed for break-in operation or oscillator keying, a small amount of fixed bias must be used to maintain the plate dissipation within the rated value. With 2000 volts on the plate, and 250 volts on grid No.2, a fixed bias of at least -40 volts should be used.

● Continuous Commercial Service.

Data on operating frequencies for the 4-65A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

4-65A

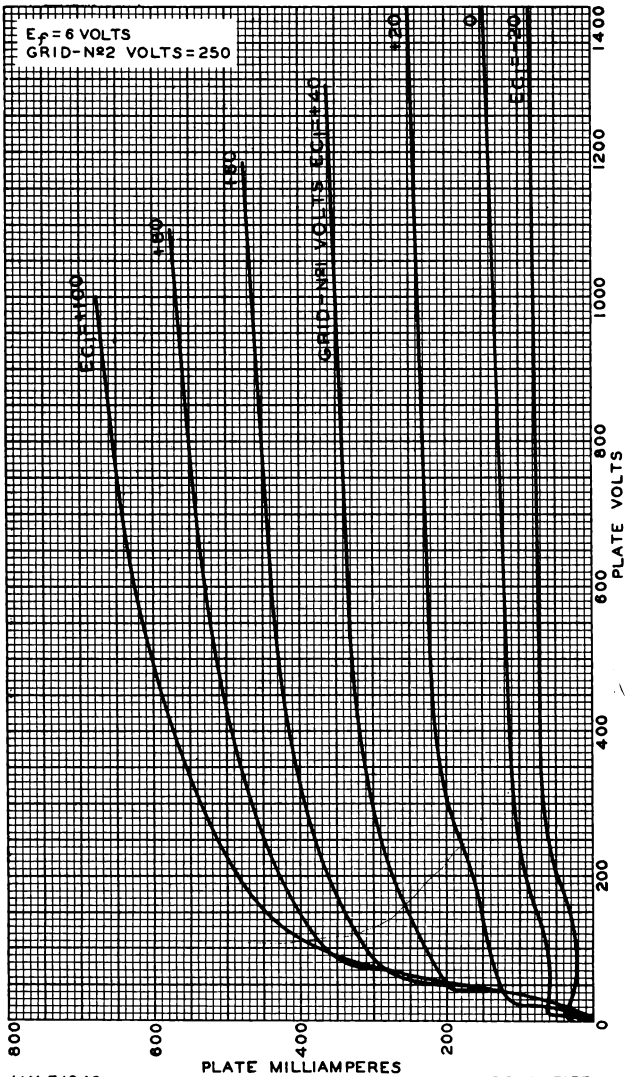
VHF POWER TETRODE



4-65A

4-65A

AVERAGE PLATE CHARACTERISTICS



JAN. 7, 1949

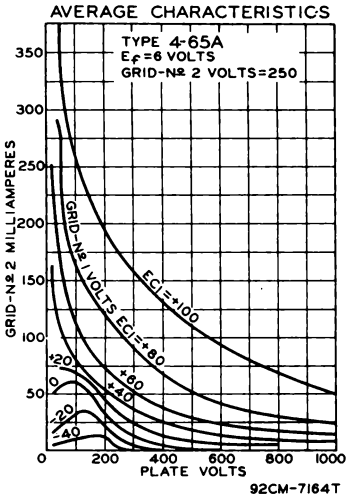
TUBE DEPARTMENT

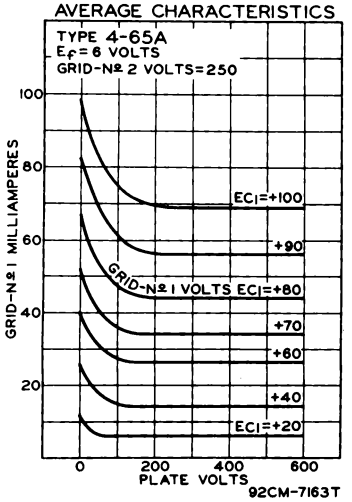
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7157

4-65A

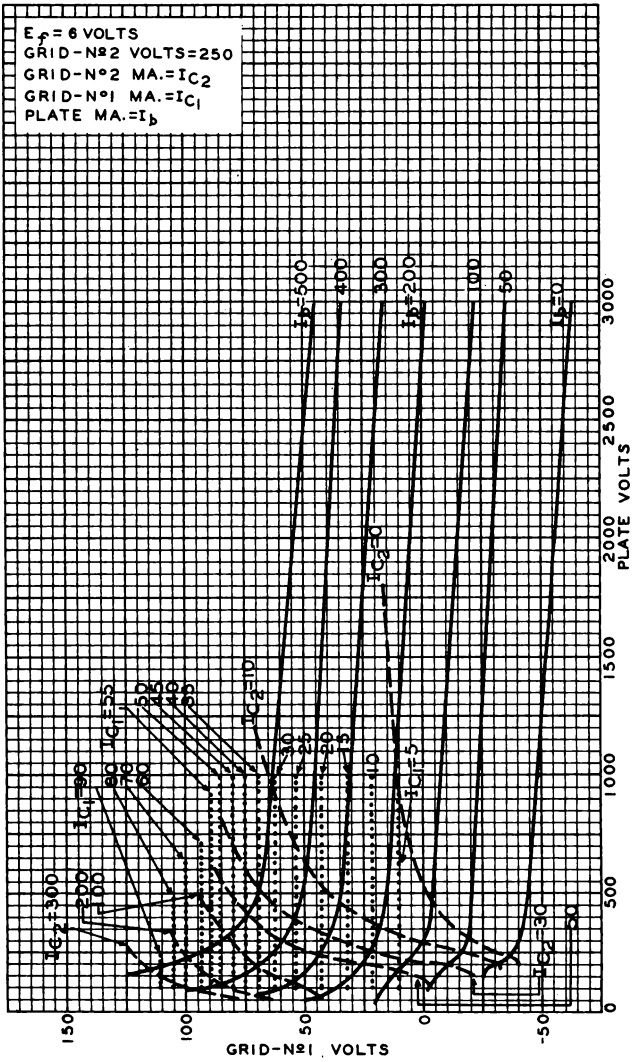
VHF POWER TETRODE





4-65A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



4-125A/4D21
VHF POWER TETRODE

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:

Voltage	5.0	ac or dc volts
Current	6.5	amp
Transconductance (Approx.) for plate current of 50 ma.	2450	μmhos
Mu-Factor, Grid No.2 to Grid No.1	6.2	
Direct Interelectrode Capacitances:		
Grid No.1 to Plate[o]	0.05	μμf
Input	10.8	μμf
Output	3.1	μμf

[o] With no external shielding and with base shell connected to ground.

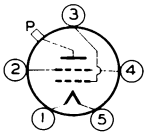
Mechanical:

Mounting Position	Vertical, base up or down
Overall Length	5-7/16" ± 1/4"
Seated Length	4-11/16" ± 1/4"
Maximum Diameter	2-7/8"
Cap	Skirted Small
Base[□]	Special Metal-Shell Giant 5-Pin
Basing Designation for BOTTOM VIEW	5BK

Pin 1 - Filament

Pin 2 - Grid No.2

Pin 3 - Grid No.1



Pin 4 - Grid No.2

Pin 5 - Filament

Cap - Plate

Forced-Air Cooling:

Through Base Toward Bulb . . . . . 2 cfm ←

The specified air flow from a small fan or centrifugal blower should be applied simultaneously with filament power.

Of Bulb and Plate Seal:

Continuous Service: At frequencies below 30 Mc, relatively slow movement of air past the tube is sufficient to prevent exceeding the specified plate-seal temperature. At frequencies above 30 Mc, special attention should be given to adequate cooling of bulb and plate seal. A small fan directed toward the upper part of the bulb will generally provide sufficient cooling.

Intermittent Service: ("On" period does not exceed 5 minutes and is followed by "off" period of the same or greater duration): At frequencies below

[□] Metal base shell should be grounded by means of suitable spring fingers.

← Indicates a change

4-125A / 4D21

VHF POWER TETRODE

30 Mc, forced-air cooling of the bulb and plate seal is not usually required if the ambient temperature is below 30°C, provided a heat-radiating plate connector is used and free circulation of air is provided.

Plate-Seal Temperature (Measured on top of plate cap):

Continuous Service	170 max.	°C
Intermittent Service (As defined above)	220 max.	°C

→ AF POWER AMPLIFIER & MODULATOR – Class AB_1#

Maximum Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	225 max.	ma
PLATE DISSIPATION*	125 max.	watts
GRID-No.2 DISSIPATION*	20 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	volts
DC Grid-No.2 Voltage▲	600	600	600	volts
DC Grid-No.1 (Control-Grid) Voltage⊕	-90	-94	-96	volts
Peak AF Grid-No.1 to Grid-No.1 Voltage	180	188	192	volts
Zero-Signal DC Plate Current	60	50	50	ma
Max.-Signal DC Plate Current	222	240	232	ma
Zero-Signal DC Grid-No.2 Current	-1.0	-0.5	-0.3	ma
Max.-Signal DC Grid-No.2 Current	17	6.4	8.5	ma
Effective Load Resistance (Plate-to-plate)	10200	13400	20300	ohms
Driving Power	0	0	0	watts
Total Harmonic Distortion	5	2	2.6	%
Max.-Signal Power Output (Approx.)	158	230	330	watts

Suscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

⊕ Total effective grid-No.1-circuit resistance should not exceed 0.25 megohm.

AF POWER AMPLIFIER & MODULATOR – Class AB_2*

Maximum Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	225 max.	ma
PLATE DISSIPATION*	125 max.	watts
GRID-No.2 DISSIPATION*	20 max.	watts

* Averaged over any audio-frequency cycle of sine-wave form.

▲,*: See next page. → Indicates a change.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

4-125A/4D21
VHF POWER TETRODE

Typical Operation: ←

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	volts
DC Grid-No.2 Voltage▲	350	350	350	volts
DC Grid-No.1 (Control-Grid) Voltage▲▲	-41	-45	-43	volts
Peak AF Grid-No.1 to Grid-No.1 Voltage	282	210	178	volts
Zero-Signal DC Plate Current	87	72	93	ma
Max.-Signal DC Plate Current	400	300	260	ma
Zero-Signal DC Grid-No.2 Current	0	0	0	ma
Max.-Signal DC Grid-No.2 Current	34	5	6	ma
Effective Load Resistance (Plate-to-plate)	7200	13600	22200	ohms
Max.-Signal Av. Driving Power (Approx.)□	2.5	1.4	1	watts
Max.-Signal Peak Driving Power (Approx.)□	5.2	3.1	2.4	watts
Total Harmonic Distortion	2.5	1	2.2	%
Max.-Signal Power Output (Approx.)	350	350	400	watts

▲ Obtained from source having good regulation.

★ Subscript 2 indicates that grid current flows during some part of input cycle.

▲▲ Obtained from fixed supply having dc resistance not exceeding 250 ohms.

□ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the AB_2 stage. The effective resistance per grid-No.1 circuit of the AB_2 stage should be held at a low value.

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	2500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	200 max.	ma
PLATE DISSIPATION	85 max.	watts
GRID-No.2 DISSIPATION	20 max.	watts
GRID-No.1 DISSIPATION	5 max.	watts

Typical Operation:

DC Plate Voltage	2000	2500	volts
DC Grid-No.2 Voltage†	350	350	volts

† Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate supply through a series resistor.

← Indicates a change.

4-125A/4D21
VHF POWER TETRODE

DC Grid-No.1 Voltage††	-220	-210	volts
Peak RF Grid-No.1 Voltage (Approx.)	375	360	volts
DC Plate Current	150	152	ma
DC Grid-No.2 Current	33	30	ma
DC Grid-No.1 Current*	10	9	ma
Driving Power (Approx.)*	3.8	3.3	watts
Power Output (Approx.)	225	300	watts

†† For high-level modulated service, the use of partial grid-resistor bias is recommended. Bypass capacitors across the grid resistor should have a reactance at the highest modulation frequency equal to at least twice the grid-resistor value.

RF POWER AMPLIFIER & OSCILLATOR—

Class C Telegraphy or FM Telephony

Key-down conditions per tube without amplitude modulation

Maximum Ratings, ***Absolute Values*****:**

DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	225 max.	ma
PLATE DISSIPATION	125 max.	watts
GRID-No.2 DISSIPATION	20 max.	watts
GRID-No.1 DISSIPATION	5 max.	watts

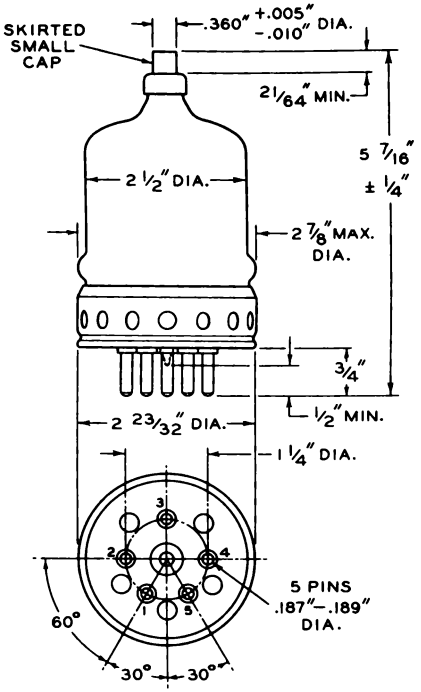
Typical Operation:

DC Plate Voltage	2000	2500	3000	volts
DC Grid-No.2 Voltage	350	350	350	volts
DC Grid-No.1 Voltage	-100	-150	-150	volts
Peak RF Grid-No.1 Voltage (Approx.)	230	320	280	volts
DC Plate Current	200	200	167	ma
DC Grid-No.2 Current	50	40	30	ma
DC Grid-No.1 Current*	12	12	9	ma
Driving Power (Approx.)*	2.8	3.8	2.5	watts
Power Output (Approx.)	275	375	375	watts

* For effect of load resistance on grid current and driving power, refer to TUBE RATINGS - Grid Current and Driving Power in the General Section.

Data on operating frequencies for the 4-125A/4D21 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

4-125A/4D21
VHF POWER TETRODE

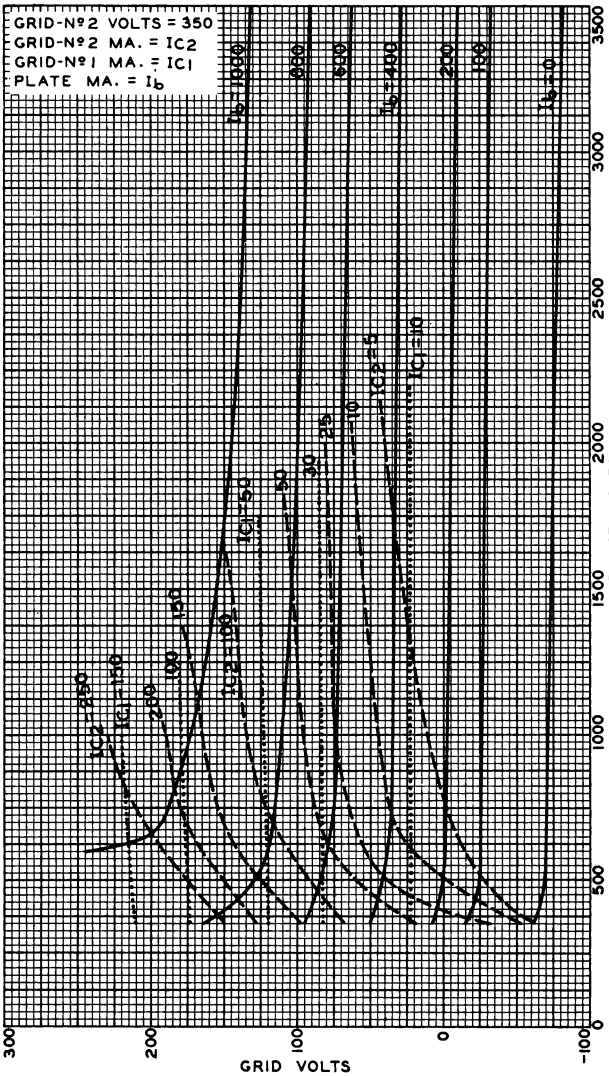


92CS-6764

4-125A

4-125A/4D21

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



MAY 21, 1946 TUBE DEPARTMENT 92CM-6767

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

4-250A/5D22

POWER TETRODE

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage	5.0	ac or dc volts
Current	14.5	amp
Transconductance (Approx.) for plate current of 100 ma.	4000	μmhos
Mu-Factor, Grid No.2 to Grid No.1	5.1	
Direct Interelectrode Capacitances:		
Grid No.1 to Plate[o]	0.12	μμf
Input	12.7	μμf
Output	4.5	μμf

[o] With no external shield and with base shell connected to ground.

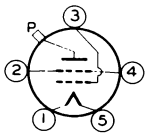
Mechanical:

Mounting Position	Vertical, base up or down
Overall Length	6-1/8" ± 1/4"
Seated Length	5-3/8" ± 1/4"
Maximum Diameter	3-9/16"
Cap	Skirted Small
Base[□]	Special Metal-Shell Giant 5-Pin
Basing Designation for BOTTOM VIEW	5BK

Pin 1 - Filament

Pin 2 - Grid No.2

Pin 3 - Grid No.1



Pin 4 - Grid No.2

Pin 5 - Filament

Cap - Plate

Forced-Air Cooling:

Through Base Toward Bulb . . . . . 5 cfm

The specified air flow from a small fan or centrifugal blower should be applied simultaneously with filament power.

Of Bulb and Plate Seal:

Continuous Service: At frequencies below 30 Mc, relatively slow movement of air past the tube is sufficient to prevent exceeding the specified plate-seal temperature. At frequencies above 30 Mc, special attention should be given to adequate cooling of bulb and plate seal. A small fan directed toward the upper part of the bulb will generally provide sufficient cooling.

Intermittent Service ("On" period does not exceed 5 minutes and is followed by "off" period of the same or greater duration): At frequencies below 30 Mc,

[□] Metal base shell should be grounded by means of suitable spring fingers.

4-250A/5D22
POWER TETRODE

forced-air cooling of the bulb and plate seal is not usually required if the ambient temperature is below 30°C, provided a heat-radiating plate connector is used and free circulation of air is provided.

Plate-Seal Temperature (Measured on top of plate cap):		
Continuous Service	170 max.	°C
Intermittent Service (As defined above).	220 max.	°C

AF POWER AMPLIFIER & MODULATOR - Class AB_1#

Maximum Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*.	350 max.	ma
PLATE DISSIPATION*	250 max.	watts
GRID-No.2 DISSIPATION*	35 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	3000	volts
DC Grid-No.2 Voltage▲. . .	500	500	500	500	volts
DC Grid-No.1 (Control-Grid) Voltage●. . .	-64	-88	-90	-93	volts
Peak AF Grid-No.1 to Grid-No.1 Voltage. . .	128	176	180	186	volts
Zero-Signal DC Plate Cur..	120	110	120	120	ma
Max.-Signal DC Plate Cur..	400	405	430	417	ma
Zero-Signal DC Grid-No.2 Current. . .	-0.4	-0.3	-0.3	-0.2	ma
Max.-Signal DC Grid-No.2 Current. . .	23	22	13	10.5	ma
Effective Load Resistance (Plate-to-plate). . .	6250	9170	11400	15000	ohms
Max.-Signal Driving Power.	0	0	0	0	watts
Total Harmonic Distortion.	4	2.5	2	2.5	%
Max.-Signal Power Output (Approx.). . .	310	460	625	750	watts

Subscript 1 indicates that grid current does not flow during any part of input cycle.

● Total effective grid-No.1-circuit resistance should not exceed 0.25 megohm.

AF POWER AMPLIFIER & MODULATOR - Class AB_2*

Maximum Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	350 max.	ma
PLATE DISSIPATION*	250 max.	watts
GRID-No.2 DISSIPATION*	35 max.	watts

,▲,: See next page.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

4-250A/5D22

POWER TETRODE

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	3000	volts
DC Grid-No.2 Voltage▲ . .	300	300	300	300	volts
DC Grid-No.1 (Control-Grid) Voltage▲▲. . .	-48	-48	-51	-53	volts
Peak AF Grid-No.1 to Grid-No.1 Voltage. . .	192	198	200	198	volts
Zero-Signal DC Plate Cur.	100	120	120	125	ma
Max.-Signal DC Plate Cur.	485	510	500	473	ma
Zero-Signal DC Grid-No.2 Current . .	0	0	0	0	ma
Max.-Signal DC Grid-No.2 Current . .	34	26	23	33	ma
Effective Load Resistance (Plate-to-plate). . .	5400	8000	10900	16000	ohms
Max.-Signal Av. Driving Power (Approx.)■ . .	2.1	2.3	2.2	1.9	watts
Max.-Signal Peak Driving Power (Approx.)■ . .	4.7	5.5	4.8	4.6	watts
Total Harmonic Distortion.	3	4	4	4.5	%
Max.-Signal Power Output (Approx.). . .	428	650	840	1040	watts

* Averaged over any audio-frequency cycle of sine-wave form.

▲ Obtained from a source having good regulation.

★ Subscript 2 indicates that grid current flows during some part of input cycle.

▲▲ Obtained from fixed supply having dc resistance not exceeding 250 ohms.

■ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the class AB_2 stage. The effective resistance per grid-No.1 circuit of the class AB_2 stage should be held at a low value.

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	3200 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	600 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE.	-500 max.	volts
DC PLATE CURRENT	275 max.	ma
PLATE DISSIPATION.	165 max.	watts
GRID-No.2 DISSIPATION.	35 max.	watts
GRID-No.1 DISSIPATION.	5 max.	watts

Typical Operation:

DC Plate Voltage	2500	3000 . .	volts
DC Grid-No.2 Voltage †	400	400 . .	volts
DC Grid-No.1 Voltage ††	-200	-310 . .	volts

†,††: See next page.

4-250A/5D22
POWER TETRODE

Peak RF Grid-No.1 Volt. (Approx.)	255	365		volts
DC Plate Current	200	225		ma
DC Grid-No.2 Current	30	30		ma
DC Grid-No.1 Current (Approx.)*	9	9		ma
Driving Power (Approx.)*	2.2	3.2		watts
Power Output (Approx.)	375	510		watts

† Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate supply through a series resistor.

†† For high-level modulated service, the use of partial grid-resistor bias is recommended. Bypass capacitors across the grid resistor should have a reactance at the highest modulation frequency equal to at least twice the grid-resistor value.

RF POWER AMPLIFIER & OSCILLATOR—

Class C Telegraphy or FM Telephony

Key-down conditions per tube without amplitude modulation

Maximum Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	600 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	350 max.	ma
PLATE DISSIPATION	250 max.	watts
GRID-No.2 DISSIPATION	35 max.	watts
GRID-No.1 DISSIPATION	5 max.	watts

Typical Operation:

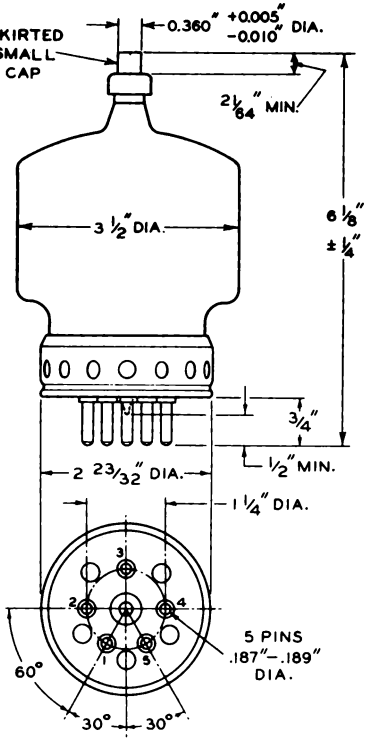
DC Plate Voltage	2500	3000	4000	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 Voltage	-150	-180	-225	volts
Peak RF Grid-No.1 Voltage (Approx.)	220	265	303	volts
DC Plate Current	300	345	312	ma
DC Grid-No.2 Current	60	60	45	ma
DC Grid-No.1 Current (Approx.)*	9	10	9	ma
Driving Power (Approx.)*	1.7	2.6	2.46	watts
Power Output (Approx.)	575	800	1000	watts

* For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—Grid Current and Driving Power in the General Section.

Data on operating frequencies for the 4-250A/5D22 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

4-250A/5D22
POWER TETRODE

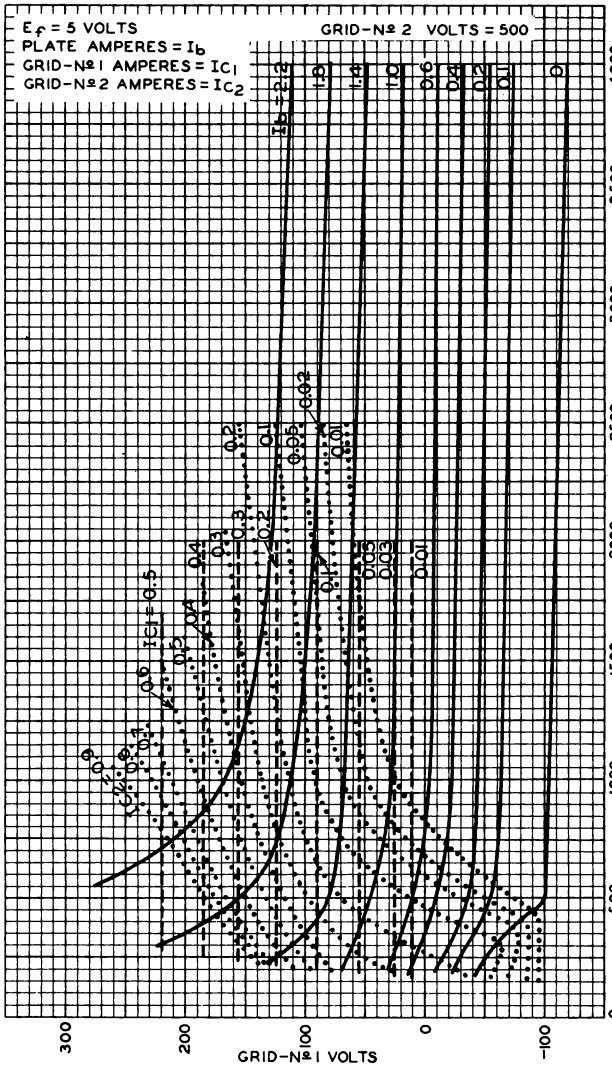


92CS-7075

4-250A

4-250A / 5D22

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



SEPT. 23, 1948

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7078

4-1000A
BEAM POWER AMPLIFIER

FORCED-AIR COOLED

GENERAL DATA

Electrical:

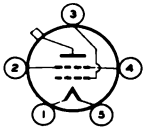
Filament, Thoriated Tungsten:		
Voltage	7.5 ± 5%	ac or dc volts
Current	21	amp
Mu-Factor, Grid No.2 to Grid No.1	7	
Transconductance for plate volts = 2500, grid-No.2 volts = 500, and plate ma. = 300	10000	μmhos
Direct Interelectrode Capacitances:		
Grid No.1 to Plate*	0.24	μμf
Input	27.2	μμf
Output	7.6	μμf

Mechanical:

Mounting Position	Vertical, base up or down
Overall Length	9-1/4" ± 3/8"
Seated Length	8-3/8" ± 3/8"
Maximum Diameter	5-1/4"
Cap	Skirted Medium
Base	Special Ventilated Metal-Shell 5-Pin
Socket	Eimac 4-1000A Air-System Socket, or equivalent

BOTTOM VIEW

Pin 1 - Filament
Pin 2 - Grid No.2
Pin 3 - Grid No.1



Pin 4 - Grid No.2
Pin 5 - Filament
Cap - Plate

Air Flow:

Through Base—A sufficient air flow should be provided to keep the base-seal temperature below its specified maximum value. The air should enter through the socket, cool the base pins, flow through the base, and then be directed along the bulb envelope.

To Plate Seal—Adequate air should be circulated around the envelope and plate seal to keep the temperature of the latter below its specified maximum value.

Base-Seal Temperature	150 max.	°C
Plate-Seal Temperature	200 max.	°C
Plate Heat-Dissipating Connector	Eimac HR-8, or equivalent	

AF POWER AMPLIFIER & MODULATOR--Class AB_1 †

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	6000 max.	volts

* Without external shielding and with base sleeve grounded.

† Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

●: See next page.

4-1000A

POWER TETRODE

DC GRID-No.2 (SCREEN) VOLTAGE	1000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT**	700 max.	ma
PLATE DISSIPATION**	1000 max.	watts
GRID-No.2 DISSIPATION**	75 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	4000	5000	6000	volts
DC Grid-No.2 Voltage	1000	1000	1000	volts
DC Grid-No.1 (Control-Grid) Voltage	-115	-125	-135	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	230	250	270	volts
Zero-Sig. DC Plate Current	300	240	200	ma
Max.-Sig. DC Plate Current	1050	1000	950	ma
Zero-Sig. DC Grid-No.2 Cur.	0	0	0	ma
Max.-Sig. DC Grid-No.2 Cur.	60	60	64	ma
Effective Load Resistance (Plate to plate)	7000	10000	14000	ohms
Max.-Signal Driving Power (Approx.)	0	0	0	watts
Max.-Signal Power Output (Approx.)	2340	3100	3840	watts

Maximum Circuit Values:

DC Resistance in Series with Grid No.1 of Each Tube	0.25 max.	megohm

AF POWER AMPLIFIER & MODULATOR--Class AB_2#

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	6000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	1000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT**	700 max.	ma
PLATE DISSIPATION**	1000 max.	watts
GRID-No.2 DISSIPATION**	75 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	4000	5000	6000	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 (Control-Grid) Voltage	-60	-70	-75	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	280	290	260	volts
Zero-Sig. DC Plate Current	300	200	150	ma
Max.-Sig. DC Plate Current	1200	1100	950	ma

** Averaged over any audio-frequency cycle of sine-wave form.

Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

●: See next page.

4-1000A
POWER TETRODE

Zero-Sig. DC Grid-No.2 Cur. . .	0	0	0	ma
Max.-Sig. DC Grid-No.2 Cur. . .	95	90	65	ma
Effective Load Resistance (Plate to plate)	7000	11000	15000	ohms
Max.-Signal Driving Power (Approx.)	11	11	9.4	watts
Max.-Signal Power Output (Approx.)	3000	3800	3900	watts

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

	Up to 30 Mc	*From 30 to 110 Mc*	
DC PLATE VOLTAGE	5500 max.	5000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE . . .	1000 max.	1000 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .	-500 max.	-500 max.	volts
DC PLATE CURRENT	600 max.	600 max.	ma
PLATE DISSIPATION	670 max.	670 max.	watts
GRID-No.2 DISSIPATION	75 max.	75 max.	watts
GRID-No.1 DISSIPATION	25 max.	25 max.	watts

Typical Operation up to 30 Mc:

DC Plate Voltage	5500	volts
DC Grid-No.2 Voltage (Modulated 100%) . . .	500	volts
DC Grid-No.1 Voltage	-200	volts
Peak AF Grid-No.2 Voltage (For 100% modulation)	250	volts
Peak RF Grid-No.1 Voltage	325	volts
DC Plate Current	600	ma
DC Grid-No.2 Current	105	ma
DC Grid-No.1 Current (Approx.)	28	ma
Driving Power (Approx.)	9	watts
Power Output (Approx.)	2630	watts

Typical Operation from 30 to 110 Mc:

DC Plate Voltage	3000	4000	5000	volts
DC Grid-No.2 Voltage (Modulated 100%)	500	500	500	volts
DC Grid-No.1 Voltage	-200	-200	-200	volts
Peak AF Grid-No.2 Voltage (For 100% modulation)	250	250	250	volts
Peak RF Grid-No.1 Voltage . . .	340	335	335	volts
DC Plate Current	600	600	600	ma
DC Grid-No.2 Current	145	132	130	ma
DC Grid-No.1 Current (Approx.).	36	33	33	ma

●: See next page.

4-1000A
POWER TETRODE

Driving Power (Approx.)●	12	11	11	watts
Power Output (Approx.)	1390	1910	2440	watts

RF POWER AMPLIFIER & OSC.--Class C Telegraphy□
and
RF POWER AMPLIFIER--Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*

	Up to 110 Mc	
DC PLATE VOLTAGE	6000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	1000 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .	-500 max.	volts
DC PLATE CURRENT	700 max.	ma
DC PLATE DISSIPATION	1000 max.	watts
DC GRID-No.2 DISSIPATION	75 max.	watts
DC GRID-No.1 DISSIPATION	25 max.	watts

Typical Operation up to 110 Mc--Single Tube:

DC Plate Voltage	3000	4000	5000	6000	volts
DC Grid-No.2 Voltage . .	500	500	500	500	volts
DC Grid-No.1 Voltage . .	-150	-150	-200	-200	volts
Peak RF Grid-No.1 Voltage . .	290	290	355	350	volts
DC Plate Current	700	700	700	700	ma
DC Grid-No.2 Current . .	146	137	147	140	ma
DC Grid-No.1 Current (Approx.) . .	38	39	45	42	ma
Driving Power (Approx.)●	11	12	16	15	watts
Power Output (Approx.) .	1430	2100	2810	3400	watts

Typical Operation at 110 Mc--Two Tubes in Push-Pull Circuit:

DC Plate Voltage	4000	5000	6000	volts
DC Grid-No.2 Voltage	450	500	500	volts
DC Grid-No.1 Voltage	-150	-160	-180	volts
DC Plate Current	1150	1250	1250	ma
DC Grid-No.2 Current	280	240	250	ma
DC Grid-No.1 Current	80	80	100	ma
Driver Power Output (Approx.)♦ .	350	400	400	watts
Useful Power Output (Approx.)♦♦.	3000	4200	5200	watts

● Continuous Commercial Service.

● The values of required driving power increase above 30 Mc. At 110 Mc, the driver should be capable of providing 200 watts per tube to supply feed-through power, circuit losses and radiation losses.

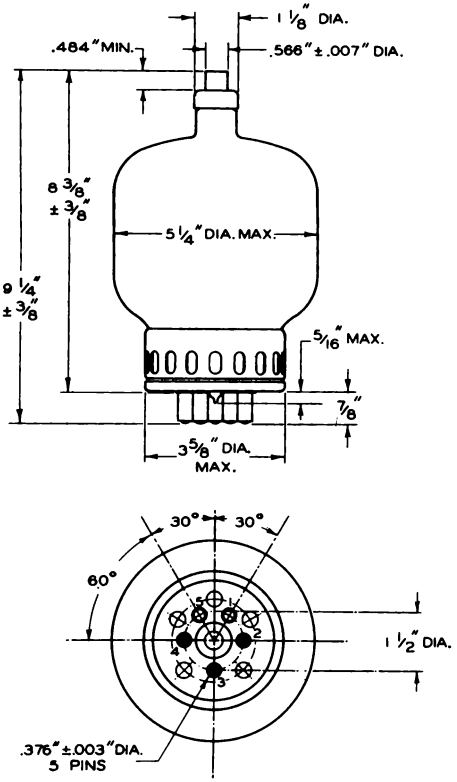
□ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

♦ Indicated values include power required by a practical resonant circuit and by the tube.

♦♦ Indicated values of useful power are measured in load circuit.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

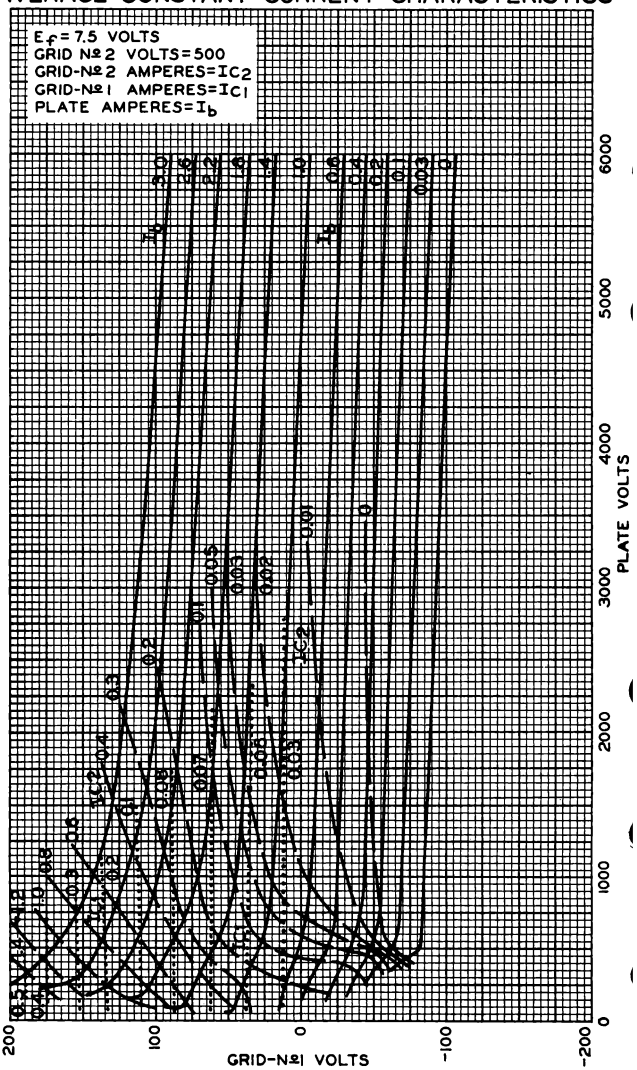
4-1000A
POWER TETRODE



4-1000A

4-1000A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



FEB. 10, 1953

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7921

4C33
POWER TRIODE

FORCED-AIR COOLED

Intended especially for pulsed operation

GENERAL DATA

Electrical:

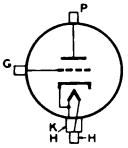
Heater, for Unipotential Cathode:

Voltage	5.0	ac or dc volts
Current	9.1	amp
Starting Current: The heater current must never exceed 16 amperes, even momentarily.		
Minimum Cathode Heating Time	2	minutes
Amplification Factor	25	
Direct Interelectrode Capacitances (Approx.):[o]		
Grid to Plate	13	μμf
Grid to Cathode	34	μμf
Plate to Cathode	0.7	μμf

[o] with no external shield.

Mechanical:

Terminal Connections:



H - Heater

G - Grid Terminal (Flange)

K - Cathode

P - Plate Terminal (Radiator)

Mounting Position	Vertical, with radiator up or down
Overall Length	4-25/32" ± 3/32"
Greatest Diameter	2.056" ± 0.006"
Radiator	Integral Part of Tube

Air Flow:

Through Radiator (for max. rated dissipation) 18 min. cfm

The specified air flow at a static pressure of 0.48 inch of water should be delivered through the radiator toward the bulb before and during application of any voltages.

Radiator Temperature (Measured on the core at end away from incoming air)	180 max.	°C
Grid-Flange Temperature	140 max.	°C
Glass Temperature	165 max.	°C

PLATE - PULSED OSCILLATOR—Class C

Maximum Ratings, *Absolute Values:*

For operating frequencies up to 625 Mc

PEAK PLATE PULSE SUPPLY VOLTAGE	13000 max.	volts
PEAK GRID-BIAS VOLTAGE	-2000 max.	volts
PEAK PLATE CURRENT FROM PULSE SUPPLY	30 max.	amp
PEAK RECTIFIED GRID CURRENT	4 max.	amp
DC PLATE CURRENT	0.030 max.	amp
DC GRID CURRENT	0.004 max.	amp
PEAK PLATE INPUT	390000 max.	watts
PLATE DISSIPATION	250 max.	watts
PULSE LENGTH	5 max.	μsec

4C33

4C33

POWER TRIODE

Typical Operation as Self-Excited Plate-Pulsed Oscillator at 600 Mc

Rectangular Pulse Shape

Peak Plate Pulse Supply Voltage	9000	volts
Peak Plate Current from Pulse Supply	27	amp
Peak Rectified Grid Current	3	amp
Peak Power Output	130000	watts
Duty Factor	0.001	
Cathode Resistor *	10	ohms
Pulse Repetition Frequency	200	cps

Maximum Circuit Values:

Grid-Circuit Resistance	200 max.	ohms

* It is recommended that the entire bias be obtained from a cathode resistor. In certain applications, partial grid-resistor bias may be used provided the grid-circuit resistance does not exceed the indicated maximum value.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

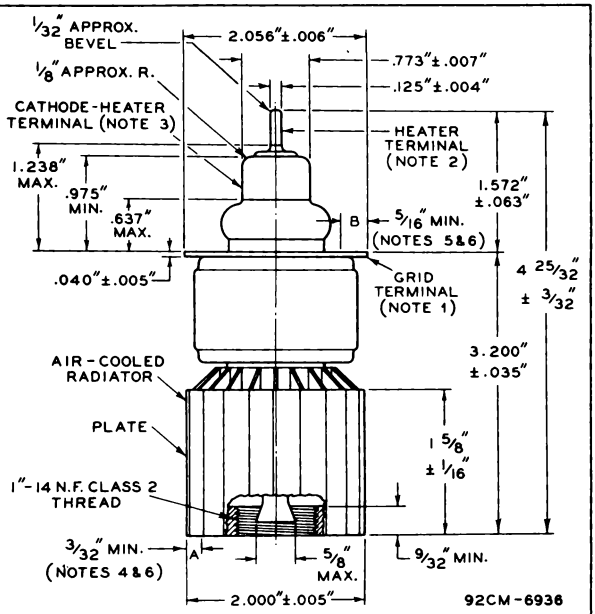
	Note	*Min.*	*Max.*	
Heater Current	1	8.2	10.0	amp
Grid-Plate Capacitance	–	11.5	15.5	μμf
Grid-Cathode Capacitance	–	27	41	μμf
Plate-Cathode Capacitance	–	0.5	0.9	μμf
Power Output During Pulse	1,2	125000	–	watts

Note 1: With 5 volts on heater.

Note 2: With "dc plate voltage during pulse" of 9000 volts, cathode resistor of 10 ohms, pulse length of 5 microseconds, duty factor of 0.001, and frequency of 600 Mc.

4C33

POWER TRIODE



NOTE 1: MAXIMUM ECCENTRICITY OF ℄ (AXIS) OF GRID-TERMINAL FLANGE WITH RESPECT TO ℄ (AXIS) OF PLATE RADIATOR IS 0.040", MEASURED WITHIN 1/32" OF BOTTOM OF RADIATOR.

NOTE 2: MAXIMUM ECCENTRICITY OF ℄ (AXIS) OF HEATER TERMINAL WITH RESPECT TO ℄ (AXIS) OF CATHODE-HEATER TERMINAL IS 0.020".

NOTE 3: MAXIMUM ECCENTRICITY OF ℄ (AXIS) OF CATHODE-HEATER TERMINAL WITH RESPECT TO ℄ (AXIS) OF GRID-TERMINAL FLANGE IS 0.020".

NOTE 4: SURFACE OF ANNULAR AREA INDICATED BY "A" ON BOTTOM OF RADIATOR IS IN SAME PLANE WITHIN 0.005", AS DETERMINED BY GAUGE 1/16" WIDE AND 0.005" THICK. THIS GAUGE WILL NOT ENTER MORE THAN 1/16" WITH BOTTOM OF RADIATOR RESTING ON FLAT PLATE.

NOTE 5: SURFACE OF ANNULAR AREA INDICATED BY "B" ON GRID-TERMINAL FLANGE IS IN SAME PLANE WITHIN 0.008", AS DETERMINED BY GAUGE METHOD DESCRIBED IN NOTE 4.

NOTE 6: SURFACE OF ANNULAR AREA INDICATED BY "A" ON BOTTOM OF RADIATOR IS PARALLEL WITHIN 0.030" TO SURFACE OF ANNULAR AREA INDICATED BY "B" ON GRID-TERMINAL FLANGE.

4E27/8001

TRANSMITTING BEAM POWER AMPLIFIER

GENERAL DATA

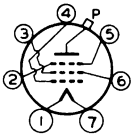
Electrical:

Filament, Thoriated Tungsten:			
Voltage	5.0	a-c or d-c	volts
Current	7.5		amp.
Transconductance for plate current of 75 ma.	2800		μmhos
Direct Interelectrode Capacitances:			
Grid to Plate	0.06		μμf ←
Input	12		μμf
Output	6.5		μμf

Physical:

Overall Length	5-15/16" ± 1/4" ←
Seated Length	5-5/16" ± 1/4" ←
Maximum Diameter	2-11/16"
Mounting Position	Vertical Only: Base up or down
Bulb	T-21
Base	Medium Metal Shell Giant 7-Pin, Bayonet
Basing Designation for BOTTOM VIEW	7BM

Pin 1 - Filament
Pin 2 - Grid No.3
Pin 3 - Grid No.2
Pin 4 - Grid No.1
Pin 5 - Grid No.3
Pin 6 - Grid No.2



Pin 7 - Filament
Bulb, Terminal - Plate
Base, Shell - Internal Shield

A-F POWER AMPLIFIER & MODULATOR - Class A1

Maximum Ratings, ***Absolute Values*****:**

D-C PLATE VOLTAGE	2000 max.	volts
D-C SCREEN VOLTAGE (Grid No.2)	750 max.	volts ←
D-C PLATE CURRENT	150 max.	ma.
D-C SCREEN CURRENT	40 max.	ma. ←
PLATE INPUT	75 max.	watts
SCREEN INPUT	30 max.	watts ←
PLATE DISSIPATION	75 max.	watts

Typical Operation: ←

D-C Plate Voltage	500	1000	volts
D-C Suppressor Voltage (Grid No.3)◊	60	0	volts
D-C Screen Voltage	500	300	volts
D-C Grid Voltage (Grid No.1)* #	-47	-27	volts
Peak A-F Grid Voltage	47	27	volts
D-C Plate Current	150	75	ma.
D-C Screen Current	10	5	ma.
Load Resistance	2600	12000	ohms
Power Output	30	34 approx.	watts

*; #: See next page. ◊ : See end of tabulation. ← Indicates a change.

4E27

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

SUPPRESSOR-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

D-C PLATE VOLTAGE	2000 max.	volts
D-C SUPPRESSOR VOLTAGE (Grid No.3)	-500 max.	volts
← D-C SCREEN VOLTAGE (Grid No.2)	600 max.	volts
D-C GRID VOLTAGE (Grid No.1)	-500 max.	volts
D-C PLATE CURRENT	100 max.	ma.
← D-C GRID CURRENT	25 max.	ma.
PLATE INPUT	110 max.	watts
← SCREEN INPUT	27 max.	watts
PLATE DISSIPATION	75 max.	watts

← **Typical Operation:**

D-C Plate Voltage	1500	2000	volts
D-C Suppressor Voltage◊	-210	-300	volts
D-C Screen Voltage**	500	600	volts
	22000	30000	ohms
D-C Grid Voltage	-130	-130	volts
Peak A-F Suppressor Voltage	210	300	volts
Peak R-F Grid Voltage	195	150	volts
D-C Plate Current	70	55	ma.
D-C Screen Current	44	45	ma.
D-C Grid Current	8	3	approx. ma.
Driving Power°	1.4	0.4	approx. watts
Power Output	33	35	approx. watts

* For a-c filament supply.

◊ Obtained from fixed supply or by cathode resistor. The d-c resistance in the grid circuit should not exceed 50000 ohms with fixed bias, or 500000 ohms with cathode bias.

**Obtained preferably from plate-voltage supply through series resistor of value shown.

° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

← D-C PLATE VOLTAGE	3000 max.	volts
← D-C SCREEN VOLTAGE (Grid No.2)	600 max.	volts
D-C GRID VOLTAGE (Grid No.1)	-500 max.	volts
D-C PLATE CURRENT	135 max.	ma.
← D-C SCREEN CURRENT	30 max.	ma.
D-C GRID CURRENT	25 max.	ma.
← PLATE INPUT	250 max.	watts
← SCREEN INPUT	18 max.	watts
PLATE DISSIPATION	65 max.	watts

← Indicates a change.

4E27

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

Typical Operation:

D-C Plate Voltage	1500	2500	volts ←
D-C Suppressor Voltage (Grid No.3)◇	60	60	volts
D-C Screen Voltage ##	600	600	volts
	82000	240000	ohms
D-C Grid Voltage***	-200	-200	volts
	145000	330000	ohms
	110000	250000	ohms
	310	450	ohms
Peak R-F Grid Voltage	255	220	volts
D-C Plate Current	135	100	ma.
D-C Screen Current	11	8	ma.
D-C Grid Current	1.4	0.6	approx. ma.
Driving Power	0.4	0.1	approx. watt
Power Output	145	200	approx. watts

Obtained preferably from modulated fixed supply. May also be obtained from modulated plate-voltage supply through series resistor of values shown.

***Obtained from fixed supply, grid resistor (145000,330000), or combination of cathode resistor (310,450) and grid resistor (110000,250000).

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation▲

Maximum Ratings, ***Absolute Values:***

D-C PLATE VOLTAGE	4000 max.	volts ←
D-C SCREEN VOLTAGE (Grid No.2)	750 max.	volts ←
D-C GRID VOLTAGE (Grid No.1)	-500 max.	volts
D-C PLATE CURRENT	150 max.	ma.
D-C SCREEN CURRENT	30 max.	ma. ←
D-C GRID CURRENT	25 max.	ma.
PLATE INPUT	300 max.	watts
SCREEN INPUT	25 max.	watts
PLATE DISSIPATION	75 max.	watts

Typical Operation:

D-C Plate Voltage	2000	3000	volts ←
D-C Suppressor Voltage (Grid No.3)◇	0	60	volts
D-C Screen Voltage Δ	750	750	volts
	70000	280000	ohms
D-C Grid Voltage □	-200	-200	volts
	300000	—	ohms
	1200	1800	ohms
Peak R-F Grid Voltage	225	170	volts
D-C Plate Current	150	100	ma.
D-C Screen Current	18	8	ma.
D-C Grid Current	0.7	0	approx. ma.
Driving Power	0.2	0	approx. watt
Power Output	230	235	approx. watts

◇; ▲; Δ; □: see next page. ← Indicates a change.

4E27

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

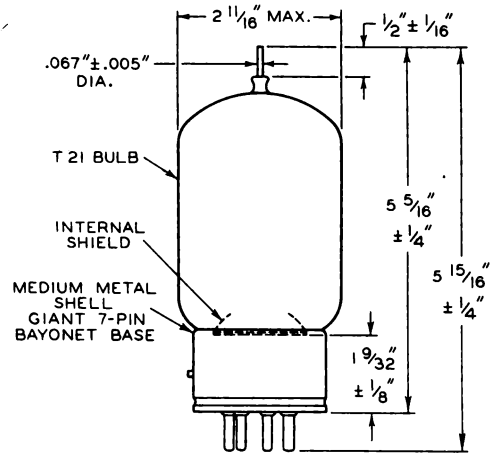
◇ Suppressor should be connected to the mid-point of filament circuit operated on a.c., or to the negative end of the filament operated on d.c.

▲ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

Δ Obtained from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown. Series screen resistor should be used only where 4E27 is employed as buffer amplifier and is not keyed. The screen voltage must not exceed 1500 volts under key-up conditions.

□ Obtained from fixed supply, grid resistor (300000), or cathode resistor (1200, 1800). When a preceding stage is keyed, sufficient fixed bias must be used to maintain the plate current at a low value when the key is up.

Data on operating frequencies for the 4E27/8001 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.



92CM-6260R1

→ Indicates a change.

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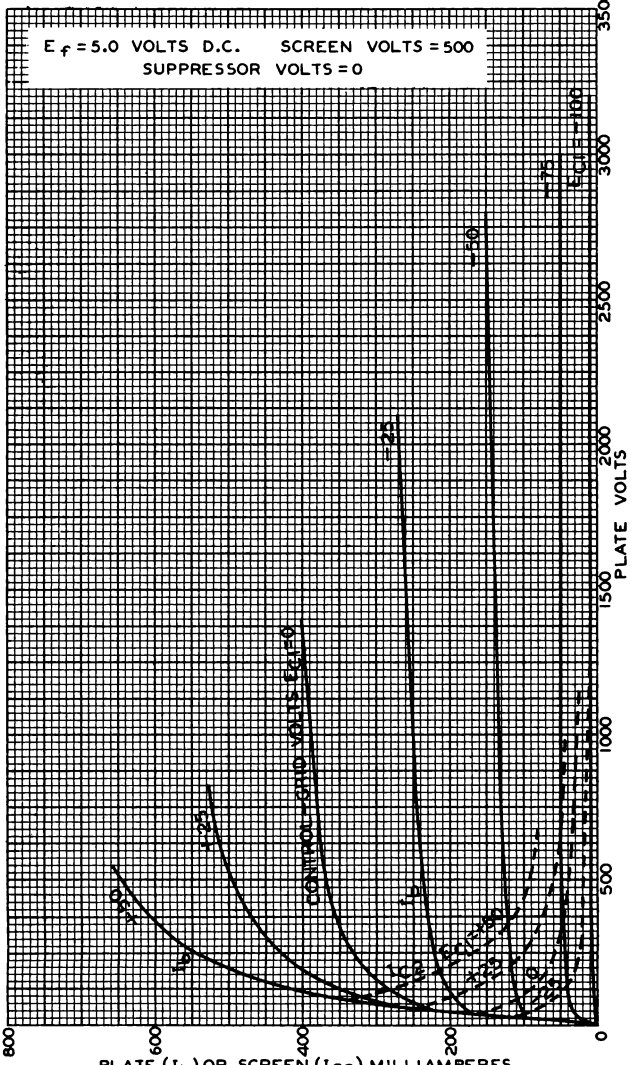
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

4E27

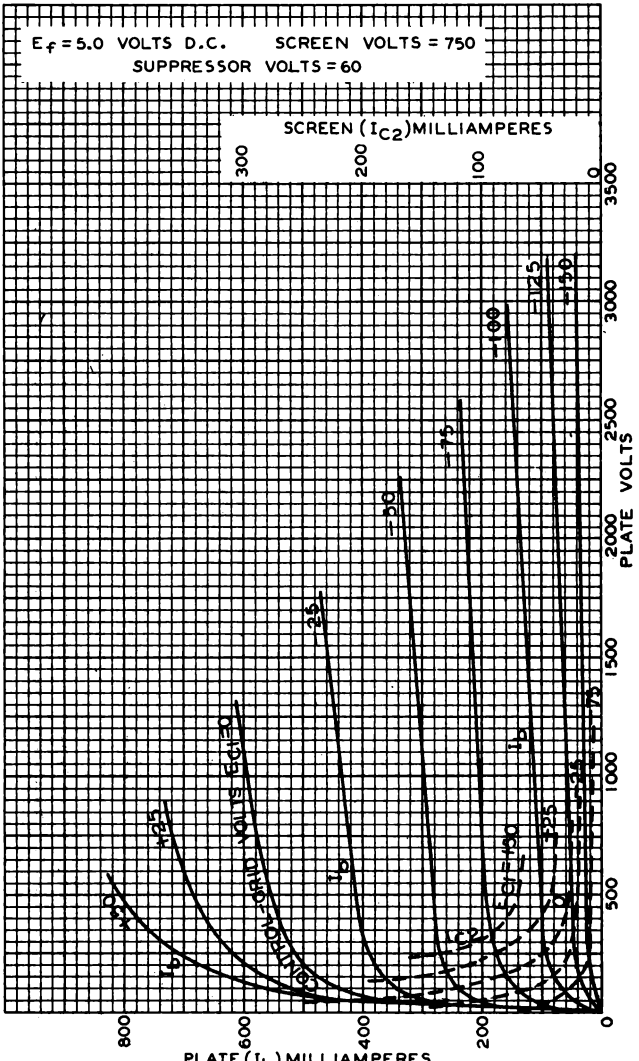
AVERAGE PLATE CHARACTERISTICS



4E27

4E27

AVERAGE PLATE CHARACTERISTICS



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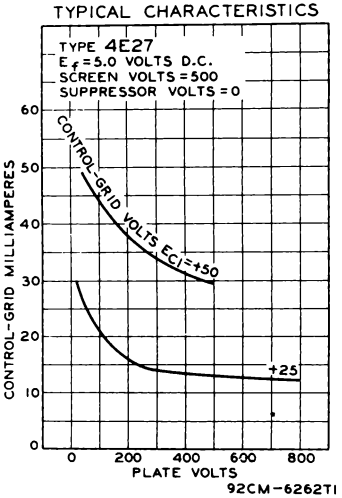
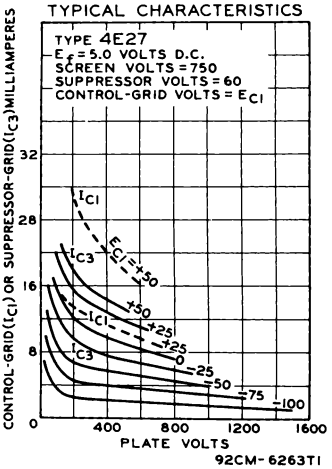
4E27

TRANSMITTING BEAM POWER AMPLIFIER





4E27A/5-125B
BEAM POWER TUBE

Full Input at Frequencies up to 75 Mc

GENERAL DATA

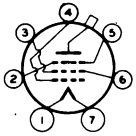
Electrical:

Filament, Thoriated Tungsten:		
Voltage	5.0	ac or dc volts
Current	7.5	amp
Transconductance (Approx.) For plate volts = 2500, grid-No.3 volts = 0, grid-No.2 volts = 500, and plate ma. = 50	2150	μmhos
Mu-Factor, Grid No.2 to Grid No.1	5	
Direct Interelectrode Capacitances:		
Grid No.1 to plate*	0.08	μμf
Input	10.5	μμf
Output	4.7	μμf

Mechanical:

Mounting Position	Vertical, base down or up ←
Maximum Overall Length	5-9/16" ←
Seated Length	5-3/8" ± 1/4"
Maximum Diameter	2-3/4"
Plate Terminal	See Dimensional Outline
Weight	6 ounces ←
Base	Ventilated Medium-Metal-Shell Giant 7-Pin
Basing Designation for BOTTOM VIEW	7BM

Pin 1 - Filament
Pin 2 - Grid No.3
Pin 3 - Grid No.2
Pin 4 - Grid No.1



Pin 5 - Grid No.3
Pin 6 - Grid No.2
Pin 7 - Filament
Bulb Terminal - Plate

Seal Temperature (Plate and stem)	225 max.	°C
Bulb Temperature (At hottest point)	250 max.	°C

Components:

Socket	Johnson No.122-237, or equivalent
Heat-Radiating Plate Connector (Supplied with tube)	Eimac HR-5

AF POWER AMPLIFIER & MODULATOR - Class AB_1† ←

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	750 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts

† Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

* With no external shielding and base shell connected to ground.

●: See next page. ←Indicates a change.

4E27A

BEAM POWER TUBE

DC PLATE CURRENT*	200 max.	ma
PLATE DISSIPATION*	125 max.	watts
GRID-No.3 (SUPPRESSOR) DISSIPATION*	20 max.	watts
GRID-No.2 DISSIPATION*	20 max.	watts
GRID-No.1 DISSIPATION*	5 max.	watts

→ **Typical Operation:**

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	volts
DC Grid-No.3 Voltage	0	0	0	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 (Control-Grid) Voltage◊	-70	-80	-85	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	140	160	170	volts
Zero-Signal DC Plate Current	110	85	65	ma
Max.-Signal DC Plate Current	205	210	220	ma
Zero-Signal DC Grid-No.2 Current (Approx.)	0	0	0	ma
Max.-Signal DC Grid-No.2 Current (Approx.)	15	13	8	ma
Effective Load Resistance (Plate to plate)	13700	18000	20000	ohms
Max.-Signal Driving Power (Approx.)	0	0	0	watts
Max.-Signal Power input	310	420	550	watts
Max.-Signal Power Output (Approx.)	200	250	300	watts

→ **Maximum Circuit Values:**

DC Resistance in Series with Grid No.1 of Each Tube	0.25 max.	megohm

→ **AF POWER AMPLIFIER & MODULATOR—Class AB_2#**

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	750 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	200 max.	ma
PLATE DISSIPATION	125 max.	watts
GRID-No.3 (SUPPRESSOR) DISSIPATION	20 max.	watts
GRID-No.2 DISSIPATION	20 max.	watts
GRID-No.1 DISSIPATION	5 max.	watts

* Averaged over any audio-frequency cycle of sine-wave form.

\# Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

●,◊: See next page. →Indicates a change.

4E27A

BEAM POWER TUBE

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	volts
DC Grid-No.3 Voltage	60	0	0	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 (Control-Grid) Voltage◊	-70	-80	-85	volts
Grid-No.1-to-Grid-No.1 Voltage	200	200	190	volts
Zero-Signal DC Plate Current	110	85	65	ma
Max.-Signal DC Plate Current	365	295	250	ma
Zero-Signal DC Grid-No.2 Current (Approx.)	0	0	0	ma
Max.-Signal DC Grid-No.2 Current (Approx.)	11	16	13	ma
Effective Load Resistance (Plate to plate)	7300	13000	20000	ohms
Max.-Signal Driving Power (Approx.)	0.5	0.3	0.2	watt
Max.-Signal Power Input	550	590	625	watts
Max.-Signal Power Output (Approx.)	300	350	400	watts

GRID No.3-MODULATED RF POWER AMPLIFIER—Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	750 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	200 max.	ma
PLATE DISSIPATION	125 max.	watts
GRID-No.3 (SUPPRESSOR) DISSIPATION	20 max.	watts
GRID-No.2 DISSIPATION	20 max.	watts
GRID-No.1 DISSIPATION	5 max.	watts

Typical Operation:

DC Plate Voltage	1500	2000	2500	volts
DC Grid-No.3 Voltage	-220	-260	-305	volts
Fixed DC Grid-No.2 Supply Voltage	610	645	650	volts
DC Grid-No.2 Voltage	400	400	400	volts
From a series grid-No.2 resistor of	5500	9100	10000	ohms
DC Grid-No.1 Voltage	-170	-180	-190	volts
Peak AF Grid-No.3 Voltage	220	260	305	volts
Peak RF Grid-No.1 Voltage	230	235	245	volts
DC Plate Current	59	59	59	ma

◊ Adjust to stated zero-signal dc plate current.

←indicates a change.

4E27A

BEAM POWER TUBE

DC Grid-No.2 Current (Approx.) . .	38	27	25	ma
DC Grid-No.1 Current (Approx.) . .	6	5	5	ma
Driving Power (Approx.)	1.4	1.3	1.2	watts
Power Output (Approx.)	35	50	61	watts

PLATE-MODULATED RF POWER AMPLIFIER—Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	3200 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	750 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .	-500 max.	volts
DC PLATE CURRENT	160 max.	ma
PLATE DISSIPATION	85 max.	watts
GRID-No.3 (SUPPRESSOR) DISSIPATION . . .	20 max.	watts
GRID-No.2 DISSIPATION	20 max.	watts
GRID-No.1 DISSIPATION	5 max.	watts

→ **Typical Operation with Grid No.3 Grounded and Grid-No.2 Volts = 500:**

DC Plate Voltage	1500	2000	2500	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 Voltage	-195	-200	-205	volts
Peak AF Grid-No.2 Voltage	350	350	350	volts
Peak RF Grid-No.1 Voltage	265	270	275	volts
DC Plate Current	150	151	152	ma
DC Grid-No.2 Current (Approx.) . .	18	17	16	ma
DC Grid-No.1 Current (Approx.) . .	7	8	8	ma
Driving Power (Approx.)	2	2	2	watts
Power Output (Approx.)	153	220	295	watts

RF POWER AMPLIFIER & OSCILLATOR—Class C Telegraphy□ and RF POWER AMPLIFIER—Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	750 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .	-500 max.	volts
DC PLATE CURRENT	200 max.	ma
PLATE DISSIPATION.	125 max.	watts
GRID-No.3 (SUPPRESSOR) DISSIPATION	20 max.	watts
GRID-No.2 DISSIPATION.	20 max.	watts
GRID-No.1 DISSIPATION.	5 max.	watts

● Continuous Commercial Service.

□ Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●,□: See next page. →Indicates a change.

4E27A

BEAM POWER TUBE

Typical Operation with Grid No.3 Grounded and Grid-No.2 Volts = 500:

DC Plate Voltage	1000	2000	3000	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 Voltage	-120	-150	-200	volts
Peak RF Grid-No.1 Voltage	170	240	270	volts
DC Plate Current	145	200	167	ma
DC Grid-No.2 Current (Approx.)	17	23	12	ma
DC Grid-No.1 Current (Approx.)	6	11	7	ma
Driving Power (Approx.)	1	2.6	1.9	watts
Power Output (Approx.)	90	275	375	watts

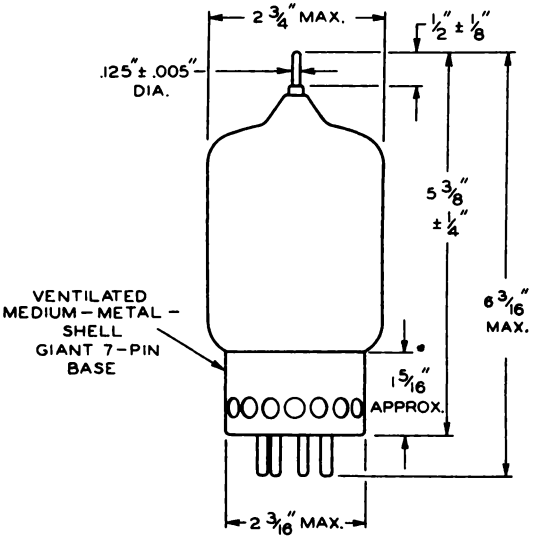
Typical Operation with Grid No.3 Grounded and Grid-No.2 Volts = 750:

DC Plate Voltage	1000	2000	3000	volts
DC Grid-No.2 Voltage	750	750	750	volts
DC Grid-No.1 Voltage	-170	-200	-250	volts
Peak RF Grid-No.1 Voltage	205	257	290	volts
DC Plate Current	160	200	167	ma
DC Grid-No.2 Current (Approx.)	21	22	9	ma
DC Grid-No.1 Current (Approx.)	3	6	3	ma
Driving Power (Approx.)	0.6	1.5	0.9	watts
Power Output (Approx.)	115	300	375	watts

Typical Operation with Grid-No.3 Volts = 60 and Grid-No.2 Volts = 500:

DC Plate Voltage	1000	2000	3000	volts
DC Grid-No.3 Voltage	60	60	60	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 Voltage	-120	-150	-200	volts
Peak RF Grid-No.1 Voltage	170	222	260	volts
DC Plate Current	167	200	167	ma
DC Grid-No.3 Current (Approx.)	6	4	3	ma
DC Grid-No.2 Current (Approx.)	11	11	5	ma
DC Grid-No.1 Current (Approx.)	6	8	6	ma
Driving Power (Approx.)	1	1.8	1.6	watts
Power Output (Approx.)	120	300	375	watts

4E27A
BEAM POWER TUBE



92CS-7437R1

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

4X150A
UHF BEAM POWER TUBE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage§	6.0 ± 10%	ac or dc volts
Current	2.6	amp
Minimum Heating Time	30	seconds

Mu-Factor, Grid No.2 to Grid No.1, for grid-No.2 volts = 300 and grid-No.2 ma. = 50 5

Direct Interelectrode Capacitances (With no external shield): ←

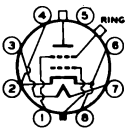
Grid No.1 to Plate	0.06 max.	μμf
Input	15	μμf
Output	4.6	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	2.468"
Maximum Seated Length	1.912"
Maximum Diameter	1.645"
Base	Special 8-Pin ←

BOTTOM VIEW

Pin 1▲ - Grid No.2
Pin 2 - Cathode
Pin 3 - Heater
Pin 4 - Cathode
Pin 5 - Internal Connection - Do Not Use
Pin 6 - Cathode



Pin 7 - Heater
Pin 8 - Cathode
Base Index Plug-Grid No.1
Radiator - Plate
Ring-Surface Terminal▲▲-Grid No.2

▲ For use at lower frequencies
▲▲ For use at higher frequencies

Socket . . . . Eimac 4X150A Air-System Socket, or equivalent
Radiator . . . . . Integral part of tube
Air Flow: ←

Through Radiator—Under any condition, the air flow must be adequate to limit the temperature of the radiator to its specified maximum value. The air flow must be applied before or simultaneously with electrode voltages and may be removed simultaneously with them. Typical values of air flow for various plate dissipations are shown in the table below.

Percentage of Max. Rated Plate Dissipation for Each Class of Service	100	80	60	per cent
Minimum Air Flow	5.6	4.1	2.5	cfm
Static Pressure	0.26	0.14	0.05	in. of water

§ Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

← Indicates a change

4X150A
UHF BEAM POWER TUBE

To Base--Forced-air cooling of the base end of the tube must be provided to limit the temperature of the base seals to the specified value.

Through Eimac 4X150A Air-System Socket--This fitting directs the air over the base seals, past the grid-No.2 seal and glass envelope, and through the radiator to provide effective cooling with minimum air flow. When the tube is operated at maximum plate dissipation, a minimum air flow of 7.5 cfm is required through the socket and radiator.

The corresponding pressure drop is 0.6 inch of water. These requirements are for operation at sea level and at an ambient temperature of 20°C. At higher altitudes and ambient temperatures, the air flow must be increased and must be adequate to limit the radiator and seal temperatures to 150°C.

Radiator Temperature (Measured on metal surface between radiator core and glass envelope) . . .	150 max.	°C
Temperature of Base Seals and Envelope Seals .	150 max.	°C
Weight (Approx.)	5	ounces

→ **AF POWER AMPLIFIER & MODULATOR - Class AB_1 ♦**

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1250 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*.	250 max.	ma
PLATE DISSIPATION*	150 max.	watts
GRID-No.2 DISSIPATION*	12 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	600	800	1000	1250	volts
DC Grid-No.2 Voltage . . .	300	300	300	300	volts
DC Grid-No.1 (Control-Grid) Voltage . .	-44	-47	-47	-48	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage . . .	88	94	94	96	volts
Zero-Signal DC Plate Current	160	120	120	115	ma
Max.-Signal DC Plate Current	380	380	380	390	ma
Zero-Signal DC Grid-No.2 Current . . .	0	0	0	0	ma
Max.-Signal DC Grid-No.2 Current . . .	65	65	60	40	ma
Effective Load Resistance (Plate to plate) .	3550	4625	5850	7200	ohms

♦ Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

●,*: See next page. → Indicates a change

4X150A
UHF BEAM POWER TUBE

Max.-Signal Driving Power (Approx.) . .	0	0	0	0	watts
Max.-Signal Power Output (Approx.) .	140	195	240	310	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance (Per tube) . . 0.1 max. megohm

AF POWER AMPLIFIER & MODULATOR - Class AB_2# ←

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1250 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	250 max.	ma
PLATE DISSIPATION*	150 max.	watts
GRID-No.2 DISSIPATION*	12 max.	watts
GRID-No.1 (CONTROL-GRID) DISSIPATION . . .	2 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	600	800	1000	1250	volts
DC Grid-No.2 Voltage . . .	300	300	300	300	volts
DC Grid-No.1 Voltage . . .	-41	-43	-43	-44	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage . .	94	96	98	100	volts
Zero-Signal DC Plate Current	185	160	165	180	ma
Max.-Signal DC Plate Current	485	490	495	475	ma
Zero-Signal DC Grid-No.2 Current	0	0	0	0	ma
Max.-Signal DC Grid-No.2 Current	80	75	70	65	ma
Effective Load Resistance (Plate to plate). . .	2600	3500	4600	5600	ohms
Max.-Signal Driving Power (Approx.) . . .	0.15	0.15	0.15	0.15	watt
Max.-Signal Power Output (Approx.). . .	170	240	315	425	watts

RF POWER AMPLIFIER - Class B Television Service ←

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS● Ratings, *Absolute Values:*

	54 to 216 Mc	
DC PLATE VOLTAGE	1250 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	volts

* Averaged over any audio-frequency cycle of sine-wave form.

\# Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

●: See next page. ← Indicates a change

4X150A

UHF BEAM POWER TUBE

DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-250 max.	volts
DC PLATE CURRENT (AVERAGE)●	250 max.	ma
PLATE DISSIPATION	150 max.	watts
GRID-No.2 DISSIPATION	12 max.	watts
GRID-No.1 DISSIPATION	2 max.	watts

Typical Operation (With bandwidth of 5 Mc):

DC Plate Voltage	750	1000	1250	volts
DC Grid-No.2 Voltage . .	300	300	300	volts
DC Grid-No.1 Voltage . .	-60	-65	-70	volts
Peak RF Grid-No.1 Voltage:				
Synchronizing Level . .	85	95	100	volts
Pedestal Level	65	70	75	volts
DC Plate Current:				
Synchronizing Level . .	335	330	305	ma
Pedestal Level	245	240	230	ma
DC Grid-No.2 Current:				
Synchronizing Level . .	50	45	45	ma
Pedestal Level	20	15	10	ma
DC Grid-No.1 Current:				
Synchronizing Level . .	15	20	25	ma
Pedestal Level	4	4	4	ma
Driver Power Output (Approx.):♦				
Synchronizing Level . .	7	8	9	watts
Pedestal Level	4.25	4.7	5.5	watts
Useful Power Output (Approx.):				
Synchronizing Level . .	135	200	250	watts
Pedestal Level	75	110	140	watts

PLATE-MODULATED RF POWER AMP. - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

	Up to 500 Mc	
DC PLATE VOLTAGE	1000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-250 max.	volts
DC PLATE CURRENT	200 max.	ma
PLATE DISSIPATION	100 max.	watts
→ GRID-No.2 DISSIPATION	12 max.	watts
GRID-No.1 DISSIPATION	2 max.	watts

→ **Typical Operation at Frequencies up to 165 Mc:**

DC Plate Voltage	400	600	800	1000	volts
DC Grid-No.2 Voltage (Modulated approx. 55%)▲. .	250	250	250	250	volts

● Averaged over any frame.

●,♦,▲: See next page. → Indicates a change

4X150A

UHF BEAM POWER TUBE

DC Grid-No.1 Voltage	-90	-95	-100	-105	volts
Peak AF Grid-No.2 Voltage (For 100% modulation)	140	150	160	170	volts
Peak RF Grid-No.1 Voltage	110	120	120	125	volts
DC Plate Current	200	200	200	200	ma
DC Grid-No.2 Current	40	35	25	20	ma
DC Grid-No.1 Current (Approx.)	7	8	10	15	ma
Driving Power (Approx.)	1	1	1.5	2	watts
Power Output (Approx.)	55	80	100	140	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	25000 max.	ohms

RF POWER AMPLIFIER & OSC. - Class C Telegraphy†
and
RF POWER AMPLIFIER - Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*

	Up to 500 Mc	
DC PLATE VOLTAGE	1250 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-250 max.	volts
DC PLATE CURRENT	250 max.	ma
PLATE DISSIPATION	150 max.	watts
GRID-No.2 DISSIPATION	12 max.	watts ←
GRID-No.1 DISSIPATION	2 max.	watts

Typical Operation at Frequencies up to 165 Mc:

DC Plate Voltage	600	750	1000	1250	volts
DC Grid-No.2 Voltage	250	250	250	250	volts
DC Grid-No.1 Voltage	-75	-80	-80	-90	volts
Peak RF Grid-No.1 Voltage	91	96	95	106	volts
DC Plate Current	200	200	200	200	volts
DC Grid-No.2 Current	37	37	31	20	ma
DC Grid-No.1 Current (Approx.)	11	11	10	11	ma
Driving Power (Approx.)	1	1	1	1.2	watts ←
Power Output (Approx.)	85	110	150	195	watts

Typical Operation at Frequency of 500 Mc with Coaxial Cavity:

DC Plate Voltage	600	800	1000	1250	volts
DC Grid-No.2 Voltage	250	250	250	280	volts
DC Grid-No.1 Voltage	-110	-110	-110	-115	volts
DC Plate Current	170	200	200	200	ma
DC Grid-No.2 Current	6	7	7	5	ma
DC Grid-No.1 Current (Approx.)	6	10	10	10	ma ←
Driver Power Output (Approx.)♦	15	20	25	30	watts

▲,●,♦,†: See next page. ← Indicates a change

4X150A
UHF BEAM POWER TUBE

Useful Power Output (Approx.) . .	50	95	120	140	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 25000 max. ohms

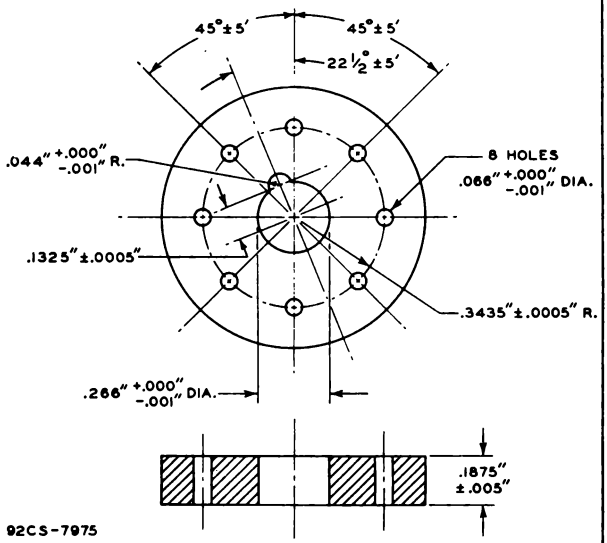
▲ The dc screen voltage must be modulated approximately 55% in phase with the plate modulation in order to obtain 100% modulation of the 4X150A. The use of a series grid-No.2 resistor or reactor may not give satisfactory performance and is therefore not recommended.

● Continuous Commercial Service.

♦ The driver stage is required to supply tube losses and rf circuit losses. The driver stage should be designed to provide an excess of power above the indicated values to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

† Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

GAUGE DRAWING



TOLERANCES ARE NOT CUMULATIVE

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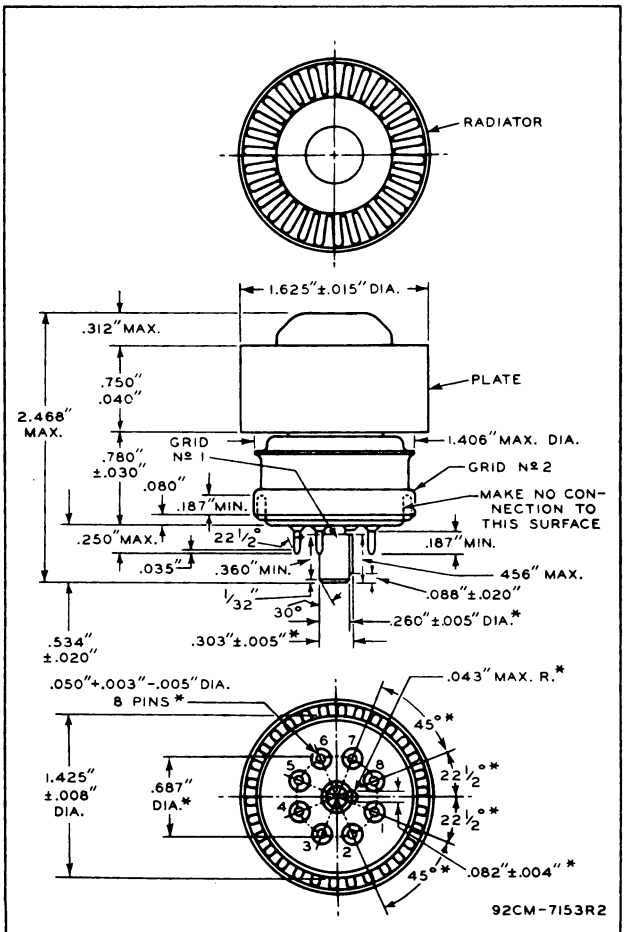
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

4X150A

UHF BEAM POWER TUBE

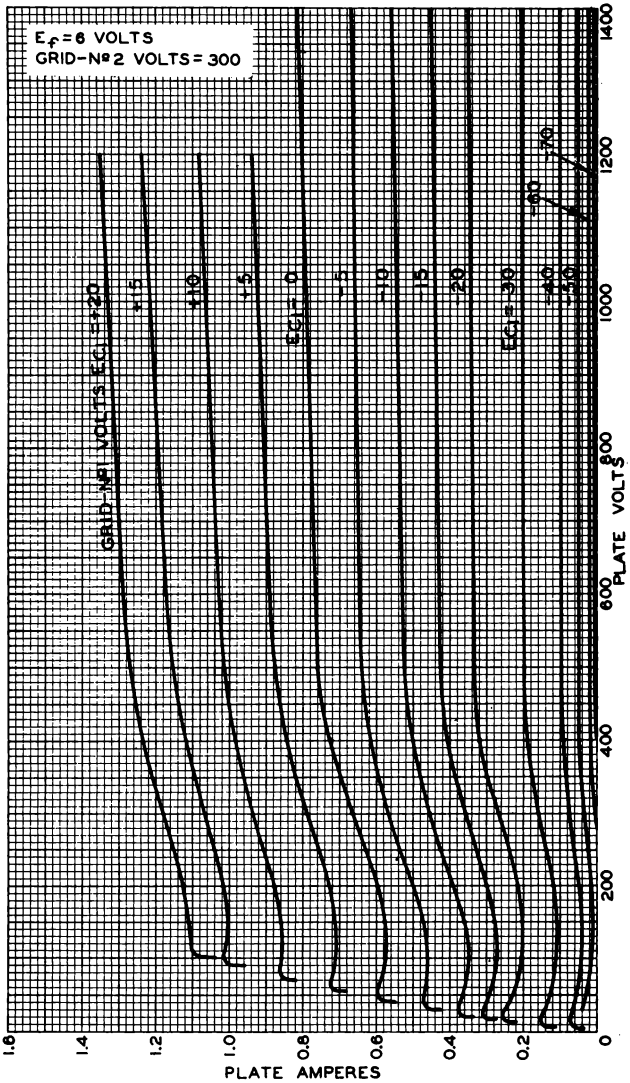


* BASE-PIN POSITIONS AND INDEX GUIDE ARE HELD TO TOLERANCES SUCH THAT THE ENTIRE LENGTH OF THE PINS WILL, WITHOUT UNDUE FORCE, PASS INTO AND DISENGAGE FROM THE FLAT-PLATE GAUGE SHOWN ON PRECEDING PAGE.

4X150A

4X150A

AVERAGE PLATE CHARACTERISTICS



MAR. 26, 1953

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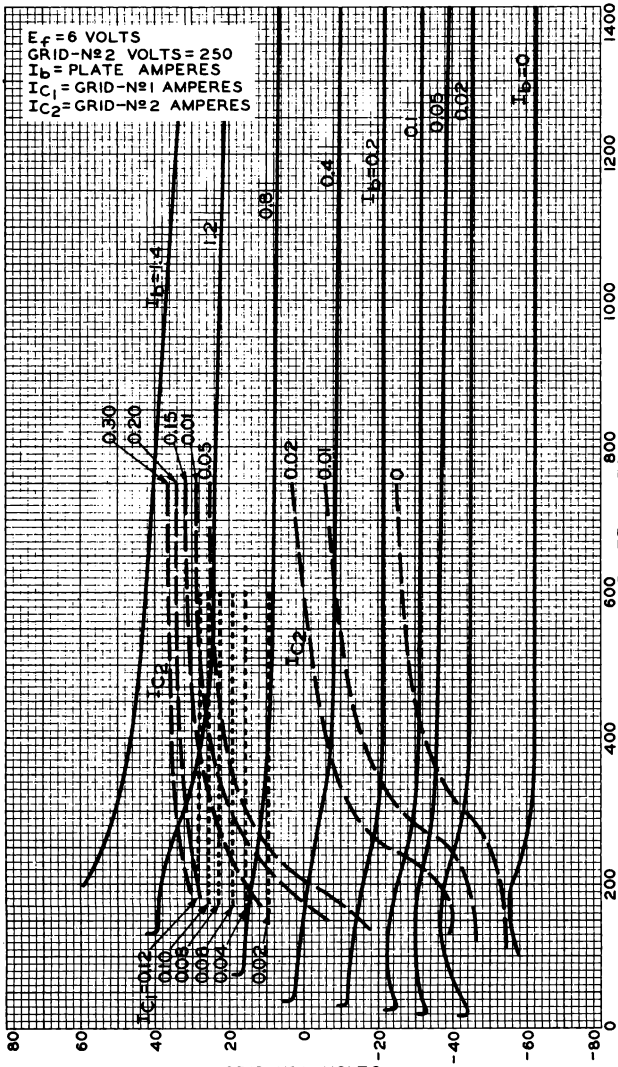
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7950

4X150A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



4X150D
BEAM POWER TUBE

FORCED-AIR COOLED

Useful at Frequencies up to 500 Mc

The 4X150D is the same as the 4X150A except for the following items:

Heater, for Unipotential Cathode:

Voltage§	26.5 ± 10%	ac or dc volts
Current.	0.58	amp

§ Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

4X500A
POWER TETRODE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:

Voltage	5.0	ac or dc volts
Current	13.5	amp
Transconductance, for plate current of 200 ma.	5200	μmhos
Mu-Factor, Grid No.2 to Grid No.1	6.2	

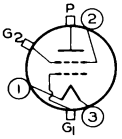
Direct Interelectrode Capacitances:

Grid No.1 to Plate	0.05	μμf
Input	12.8	μμf
Output	5.6	μμf

Mechanical:

Terminal Connections:

Pin 1 - Filament
Pin 2 - Grid No.2
Pin 3 - Filament
P - Plate Radiator Terminal



G_1 - Grid No.1 (Center Terminal on Filament End of Tube)

G_2 - Grid No.2 (Ring)

Mounting Position . . . . . Vertical, radiator up or down
Overall Length . . . . . 4-1/2" ± 1/4"
Maximum Diameter . . . . . 2-5/8"
Radiator . . . . . Integral part of tube
Forced-Air Cooling:

Of Radiator . . . . . 22 min. cfm

The specified air flow at a pressure drop of 1.4 inches of water should be passed through the radiator and should be started before the application of filament voltage.

Of Glass at Filament End of Tube . . . . 1000 min. fpm

The glass at the filament end of the tube must be cooled by passing air at the specified velocity across the filament end of tube. This air can be provided by a small fan or blower and should be supplied before applying the filament voltage.

RF POWER AMPLIFIER & OSCILLATOR -

Class C Telegraphy or FM Telephony

Key-down conditions per tube without amplitude modulation

Maximum Ratings, *Absolute Values:*

For operating frequencies up to 120 Mc.

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	500 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	350 max.	ma
PLATE DISSIPATION	500 max.	watts
GRID-No.2 DISSIPATION	30 max.	watts
GRID-No.1 DISSIPATION	10 max.	watts

4X500A
POWER TETRODE

Typical Operation in Push-Pull Amplifier at 110 Mc:

Values are for 2 tubes

DC Plate Voltage	2500	3000	volts
DC Grid-No.2 Voltage	500	400	volts
DC Grid-No.1 Voltage	-250	-200	volts
DC Plate Current	690	600	ma
DC Grid-No.2 Current	100	95	ma
DC Grid-No.1 Current	40	45	ma
Driving Power (Approx.)	20	18	watts
Power Output (Approx.)	1300	1320	watts

Typical Operation in Push-Pull Amplifier at 110 Mc:

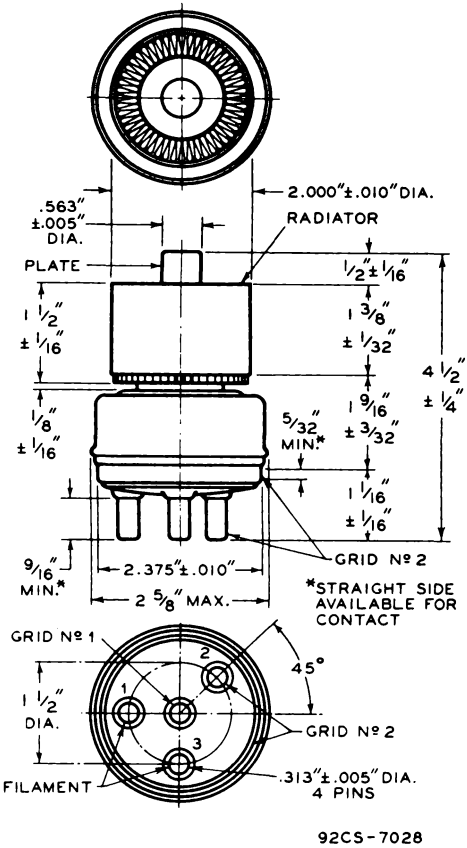
Values are for 4 tubes

DC Plate Voltage	4000	volts
DC Grid-No.2 Voltage	500	volts
DC Grid-No.1 Voltage	-250	volts
DC Plate Current	1250	ma
DC Grid-No.2 Current	160	ma
DC Grid-No.1 Current	70	ma
Driving Power (Approx.)	50	watts
Power Output (Approx.)	3900	watts

Data on operating frequencies for the 4X500A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

4X500A
POWER TETRODE



92CS-7028

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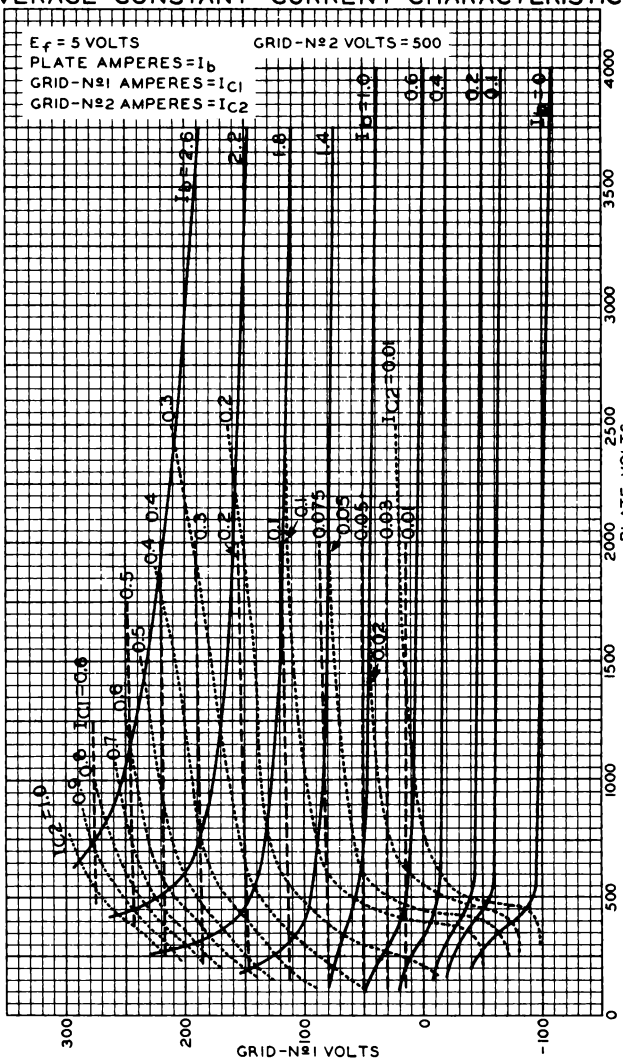
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

4X500A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



6C24

POWER TRIODE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

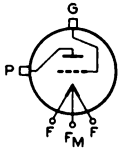
Filament, Thoriated Tungsten:

Voltage	11.0	ac or dc volts
Current	12.1	amp.
Starting Current: The filament current must never exceed, even momentarily, 24 amperes.		
Resistance (Cold)	0.13	ohms
Amplification Factor	30	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	4.4	μμf
Grid to Filament	4.6	μμf
Plate to Filament	3.2	μμf

Mechanical:

Terminal Connections:

F – Filament
F_M – Filament Mid-Tap



G – Grid Cap Terminal
P – Plate Terminal
(Air-Cooled Radiator)

Mounting Position . . . Vertical only, Filament or Grid End Up
Overall Length . . . . . 8-17/32" ± 3/16"
Diameter . . . . . 1-7/8" ± 1/32"
Radiator . . . . . Integral Part of Tube

Cooling: See following pages for cooling methods. Under any circumstances, sufficient air must be supplied to the radiator so that the rated maximum radiator temperature of 180°C measured at the base of an end fin, on the side away from the air supply, will not be exceeded. In addition, a small amount of air is required on the filament and grid seals to limit their temperature at the hottest part to 150°C. Air flow must start before the application of any voltages.

AF POWER AMPLIFIER & MODULATOR – Class B

	Cooling Method I▲	*Cooling Method II*▲	
Maximum CCS* Ratings, ***Absolute Values:***			
DC PLATE VOLTAGE	3000 max.	3000 max.	volts
MAX.-SIG. DC PLATE CURRENT**	400 max.	400 max.	ma.
MAX.-SIG. PLATE INPUT**	1200 max.	1200 max.	watts
PLATE DISSIPATION**	400 max.	600 max.	watts

Typical Operation:

Unless otherwise specified, values are for two tubes

DC Plate Voltage	3000	volts
DC Grid Voltage#oo	-95	volts
Peak AF Grid-to-Grid Voltage	470	volts

▲ See drawings on following pages.
*CCS = Continuous Commercial Service.
** Averaged over any af cycle of sine-wave form.
\# obtained from fixed or well-regulated supply.
oo Use separate bias supply for each tube for balancing currents.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6C24

6C24
POWER TRIODE

Zero-Signal DC Plate Current	75	ma.
Max.-Signal DC Plate Current	800	ma.
Effective Load Resistance (plate-to-plate)	8600	ohms
Max.-Signal Driving Power (Approx.). .	30	watts
Max.-Signal Power Output (Approx.). .	1640	watts

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	Cooling Method I▲	*Cooling Method II*▲	
Maximum CCS* Ratings, *Absolute Values*:			
DC PLATE VOLTAGE	3000 max.	3000 max.	volts
DC PLATE CURRENT	250 max.	250 max.	ma.
PLATE INPUT.	600 max.	600 max.	watts
PLATE DISSIPATION.	400 max.	600 max.	watts

Typical Operation:		
DC Plate Voltage	3000	volts
DC Grid Voltage #	-95	volts
Peak RF Grid Voltage	130	volts
DC Plate Current	200.	ma.
DC Grid Current (Approx.) ##	5	ma.
Driving Power (Approx.) ##°	16	watts
Power Output (Approx.)	210	watts

obtained from a fixed or well-regulated supply.

° At crest of af cycle with modulation factor of 1.0.

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	Cooling Method I▲	*Cooling Method II*▲	
Maximum CCS* Ratings, *Absolute Values*:			
DC PLATE VOLTAGE	2500 max.	2500 max.	volts
DC GRID VOLTAGE.	-500 max.	-500 max.	volts
DC PLATE CURRENT	400 max.	400 max.	ma.
DC GRID CURRENT.	150 max.	150 max.	ma.
PLATE INPUT.	1000 max.	1000 max.	watts
PLATE DISSIPATION	265 max.	400 max.	watts

Typical Operation:		
DC Plate Voltage	2500	volts
DC Grid Voltage:▲▲		
from a fixed supply of	-350	volts
from a grid resistor of	2600	ohms
Peak RF Grid Voltage	620	volts
DC Plate Current	400	ma.

▲ See drawings on following pages. * CCS - See next page.

Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

▲▲ obtained by grid resistor of value shown, or by partial self-bias methods.

6C24
POWER TRIODE

DC Grid Current (Approx.)##	135	ma.
Driving Power (Approx.)##	75	watts
Power Output (Approx.)	810	watts

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation¢

	Cooling Method I▲	*Cooling Method II*▲	
Maximum CCS* Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	3000 max.	3000 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT	500 max.	500 max.	ma.
DC GRID CURRENT	150 max.	150 max.	ma.
PLATE INPUT	1500 max.	1500 max.	watts
PLATE DISSIPATION	400 max.	600 max.	watts

Typical Operation:		
DC Plate Voltage	3000	volts
DC Grid Voltage:		
from fixed supply of	-250	volts
from grid resistor of	1700	ohms
from cathode resistor of	400	ohms
Peak RF Grid Voltage	520	volts
DC Plate Current	500	ma.
DC Grid Current (Approx.)##	150	ma.
Driving Power (Approx.)##	75	watts
Power Output (Approx.)	1100	watts

▲ See drawings on following pages.

¢ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

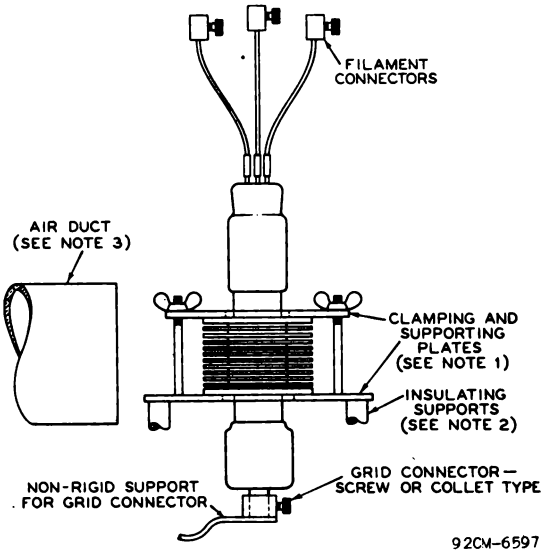
* Continuous Commercial Service.

NOTE: When the 6C24 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With plate voltage of 3000 volts, a fixed bias of at least -90 volts should be used.

Data on operating frequencies for the 6C24 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

6C24
POWER TRIODE

COOLING METHOD I
Suggested Mounting



NOTE 1: SUPPORTING PLATE AND CLAMPING PLATE HAVE HOLES LARGE ENOUGH TO PERMIT PASSAGE OF THE GLASS BULBS OF THE TUBE.

NOTE 2: TWO OR MORE INSULATORS MAY BE USED. INSULATORS MUST BE PLACED SO AS TO NOT INTERFERE WITH AIR FLOW ONTO GRID TERMINAL.

NOTE 3: AIR DUCT MUST BE HORIZONTAL AND MUST BE DIRECTED AT CENTER OF RADIATOR.

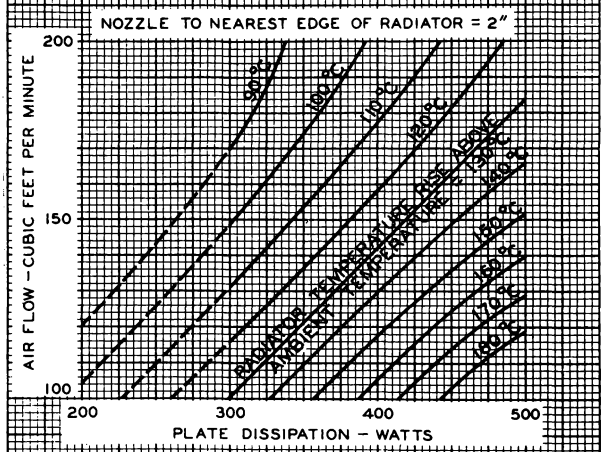
6C24

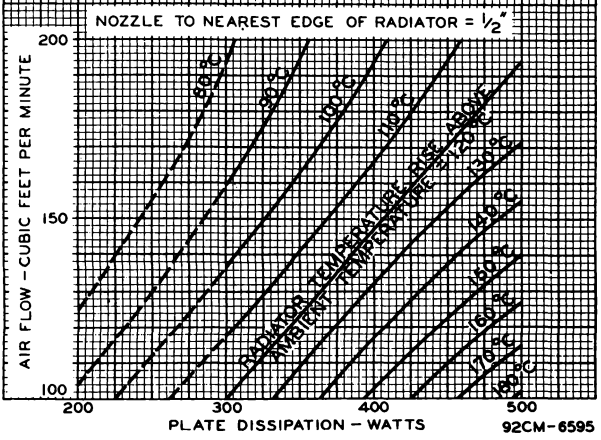
RADIATOR COOLING REQUIREMENTS
FOR COOLING METHOD I

E_f = 11 VOLTS

MAXIMUM RADIATOR TEMPERATURE = 180°C

RADIATOR TEMPERATURE MEASURED AT BASE OF END FIN ON SIDE OPPOSITE NOZZLE.

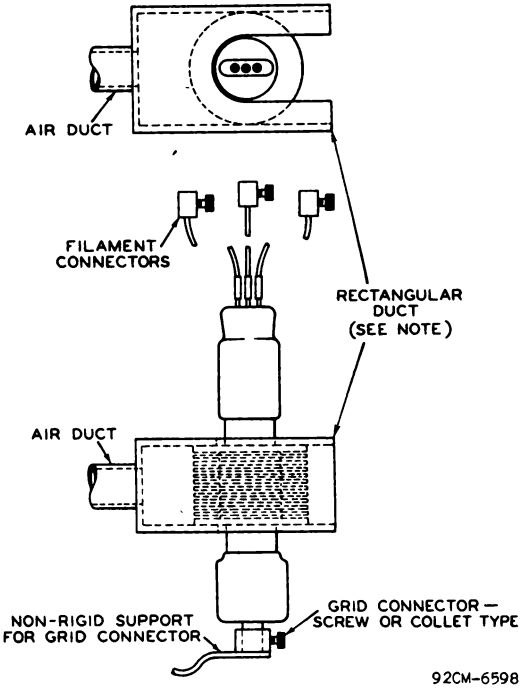




92CM-6595

6C24
POWER TRIODE

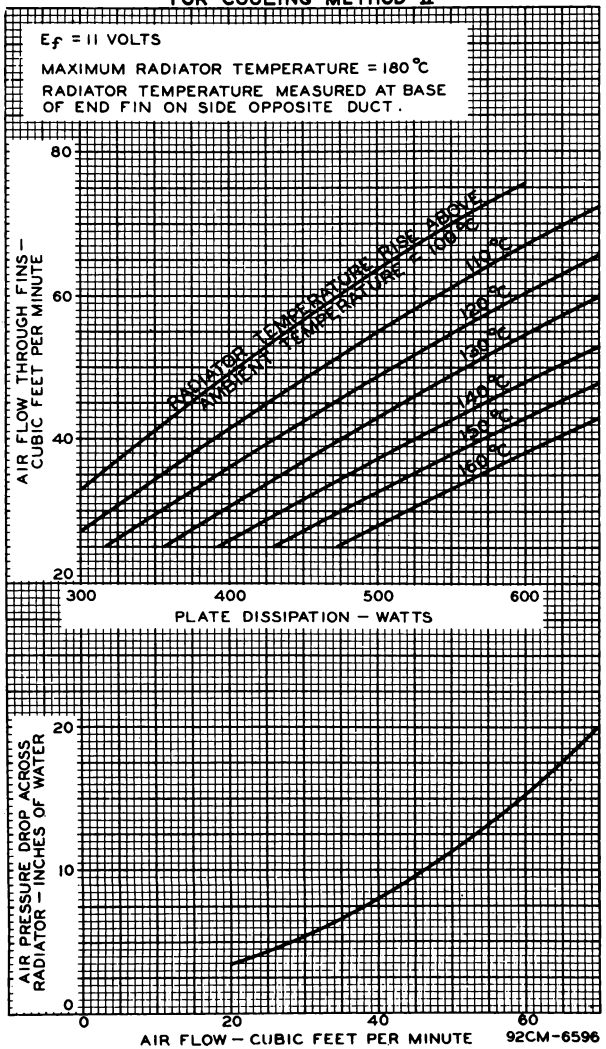
COOLING METHOD II
Suggested Mounting



NOTE: AIR DUCT MAY BE PART OF HIGH-FREQUENCY TRANSMISSION LINE. UPPER AND LOWER FACES OF RECTANGULAR DUCT HAVE SLOTS TO PERMIT PASSAGE OF TUBE. MEANS SHOULD BE PROVIDED TO LOCK TUBE IN POSITION.

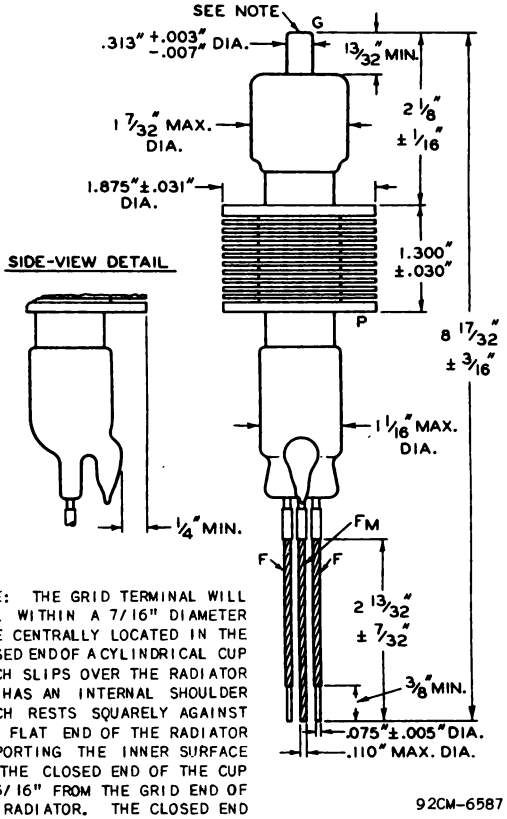
6C24

RADIATOR COOLING REQUIREMENTS
FOR COOLING METHOD II



6C24

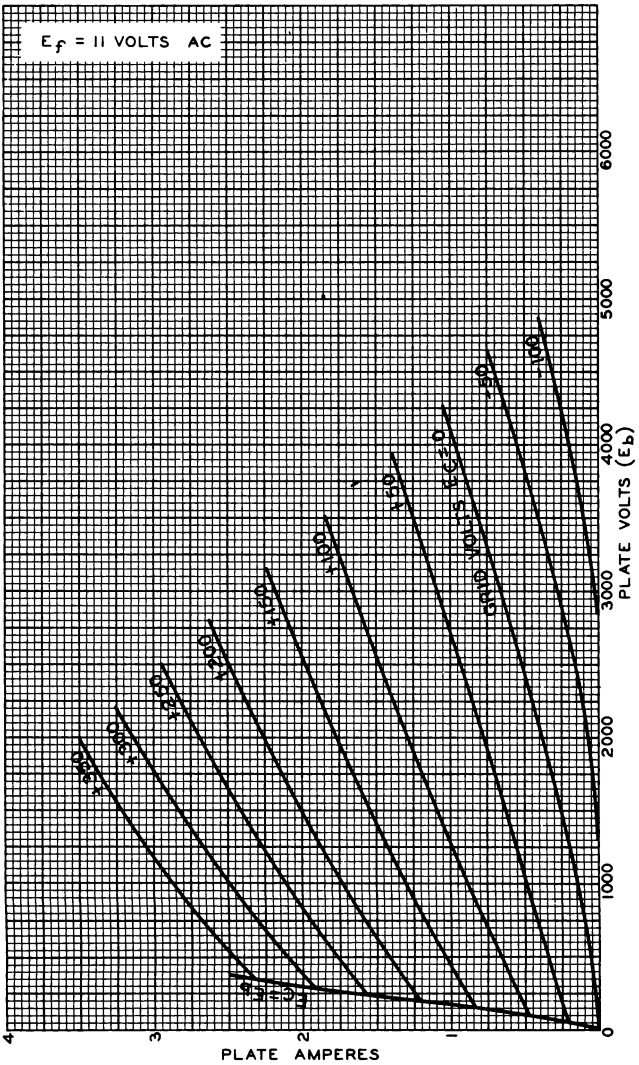
6C24
POWER TRIODE



NOTE: THE GRID TERMINAL WILL FALL WITHIN A 7/16" DIAMETER HOLE CENTRALLY LOCATED IN THE CLOSED END OF A CYLINDRICAL CUP WHICH SLIPS OVER THE RADIATOR AND HAS AN INTERNAL SHOULDER WHICH RESTS SQUARELY AGAINST THE FLAT END OF THE RADIATOR SUPPORTING THE INNER SURFACE OF THE CLOSED END OF THE CUP 1-13/16" FROM THE GRID END OF THE RADIATOR. THE CLOSED END OF THE CUP IS 7/16" THICK.

6C24

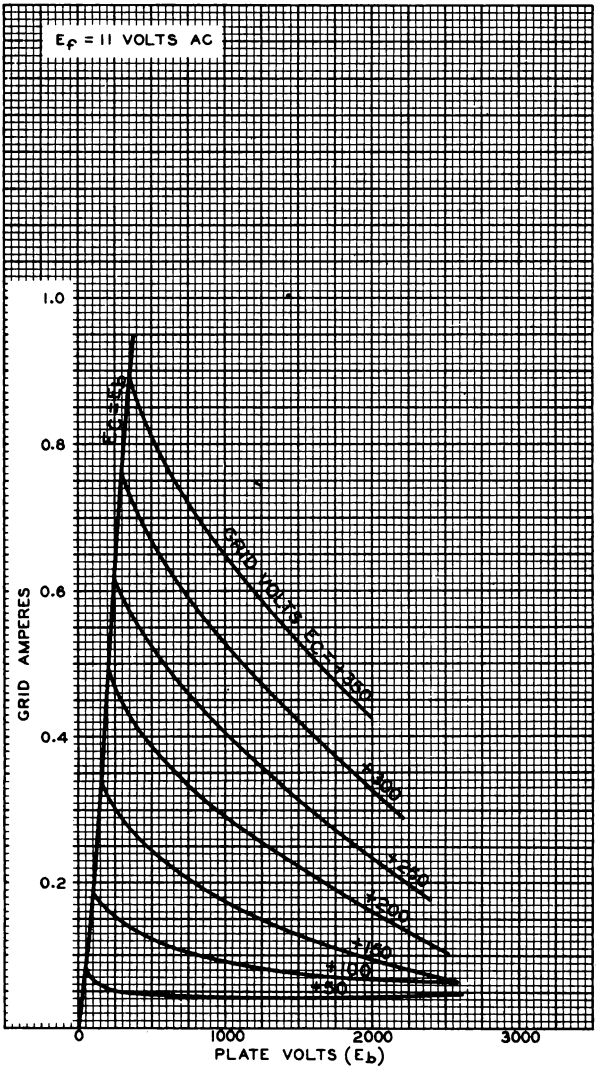
AVERAGE PLATE CHARACTERISTICS



6C24

6C24

TYPICAL CHARACTERISTICS



SEPT. 5, 1945

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6594

7C24

POWER TRIODE

FORCED-AIR COOLED, GROUNDED-GRID TYPE

GENERAL DATA

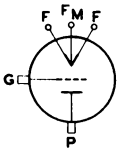
Electrical:

Filament, Thoriated-Tungsten:

Voltage	12.6 ± 0.6	ac or dc volts
Current	29	amp
Starting Current: The filament current must never exceed 175 amperes, even momentarily		
Cold Resistance	0.052	ohm
Amplification Factor	29	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	18.5	μμf ←
Grid to Filament	19	μμf
Plate to Filament	0.5	μμf

Mechanical:

Terminal Connections:



F – Filament
F_M – Filament Mid-Tap

G – Grid Terminal (Flange)
P – Plate Terminal (Radiator)

Mounting Position . . . . Vertical, filament end up or down ←

Maximum Overall Length (Excluding flexible leads) . . . 7-1/8"

Diameter . . . . . 4-5/8" ± 1/16"

Radiator . . . . . Integral Part of Tube

Air Flow: ←

Through Radiator:

The specified air flow for various plate dissipations, as indicated in the tabulation below, should be delivered by a blower through the radiator before and during the application of any voltages. Filament power, plate power, and air may be removed simultaneously.

Plate Dissipation	1.2	1.6	2.0	kw
Min. Air Flow	110	190	275	cfm
Static Pressure	0.3	0.7	1.5	in. of water

To Heater and Filament Seals . . . . . 10 min. cfm

The specified air flow from a 1" -diameter nozzle should be directed into the filament header before and during the application of any voltages in order to limit the temperature of the filament seals and the grid seal to their respective maximum value.

Incoming Air Temperature	45 max.	°C
Radiator Temperature (Measured on the core at end away from incoming air)	180 max.	°C
Bulb Temperature (At hottest part)	150 max.	°C
Seal Temperature:		
Filament	175 max.	°C ←
Grid and Plate	150 max.	°C

Components: ←

Air Jacket . . . . . RCA Type No. 229F1

← Indicates a change.

7C24

7C24

POWER TRIODE

Air Manifold	RCA Type No. 230F1
Bracelet	RCA Type No. 231F1

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	5000 max.	volts
MAX.-SIG. DC PLATE CURRENT#	1.4 max.	amp
→ MAX.-SIG. PLATE INPUT#	5.5 max.	kw
PLATE DISSIPATION#	2 max.	kw

Typical Operation:

Values are for 2 tubes unless otherwise specified

DC Plate Voltage	5000	volts
DC Grid Voltage	-200	volts
Peak AF Grid-to-Grid Voltage	760	volts
Zero-Signal DC Plate Current	0.4	amp
Max.-Signal DC Plate Current	2.0	amp
Effective Load Resistance (Plate-to-plate)	6000	ohms
Max.-Signal Driving Power (Approx.)□	110	watts
Max.-Signal Power Output (Approx.)	7	kw

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	5000 max.	volts
DC PLATE CURRENT	1.0 max.	amp
→ PLATE INPUT	3.3 max.	kw
PLATE DISSIPATION	2 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	5000	volts
DC Grid Voltage	-200	volts
Peak RF Grid Voltage	190	volts
DC Plate Current	0.6	amp
Driving Power (Approx.)○▲	50	watts
Power Output (Approx.)	1.0	kw

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	4000 max.	volts
DC GRID VOLTAGE	-1000 max.	volts

\# Averaged over any audio-frequency cycle of sine wave form.

□ The driving stage should have good regulation and should be capable of supplying considerably more than the required driving power.

▲ At crest of audio-frequency cycle with modulation factor of 1.0.

●, ○: See next page. → Indicates a change.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7C24
POWER TRIODE

DC PLATE CURRENT	1.0 max.	amp
DC GRID CURRENT	0.3 max.	amp
PLATE INPUT	3.75 max.	kw ←
PLATE DISSIPATION	1.3 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	4000	volts
DC Grid Voltage:		
from a fixed supply of	-350	volts
from a grid resistor of	1400	ohms
Peak RF Grid Voltage	570	volts
DC Plate Current	0.8	amp
DC Grid Current (Approx.)°	0.25	amp
Driving Power (Approx.)°	130	watts
Power Output (Approx.)	2.6	kw

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without amplitude modulation■

Maximum CCS• Ratings, *Absolute Values:*

DC PLATE VOLTAGE	5000 max.	volts
DC GRID VOLTAGE	-1000 max.	volts
DC PLATE CURRENT	1.4 max.	amp
DC GRID CURRENT	0.3 max.	amp
PLATE INPUT	5.5 max.	kw ←
PLATE DISSIPATION	2 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	4000	5000	volts
DC Grid Voltage:			
from a fixed supply of	-350	-400	volts
from a grid resistor of	1250	1450	ohms
from a cathode resistor of	230	310	ohms
Peak RF Grid Voltage	650	650	volts
DC Plate Current	1.25	1.0	amp
DC Grid Current (Approx.)°	0.275	0.275	amp
Driving Power (Approx.)°	160	160	watts
Power Output (Approx.)	3.8	4.0	kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.)	820	710	watts
Power Output	4.45	4.55	kw

• Continuous Commercial Service.

° For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—*Grid Current and Driving Power* in the General Section.

■ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

← Indicates a change.

7C24

7C24

POWER TRIODE

RF POWER AMPLIFIER - Class C FM Telephony

Maximum CCS● Ratings and Typical Operation in Grounded-Grid Circuit

are the same as for

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

→ **CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN**

	Note	*Min.*	*Max.*	
Filament Current	1	27	31	amp
Amplification Factor	1,2	25	33	
Grid-Plate Capacitance . . .	-	16.5	20.5	μμf
Grid-Filament Capacitance. .	-	15.5	22.5	μμf
Plate-Filament Capacitance .	-	0.38	0.62	μμf

NOTE 1: With 12.6 volts ac on filament.

NOTE 2: With dc grid voltage of -25 volts and dc plate voltage adjusted to give dc plate current of 0.5 amp.

Data on operating frequencies for the 7C24 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

→ Indicates a change.

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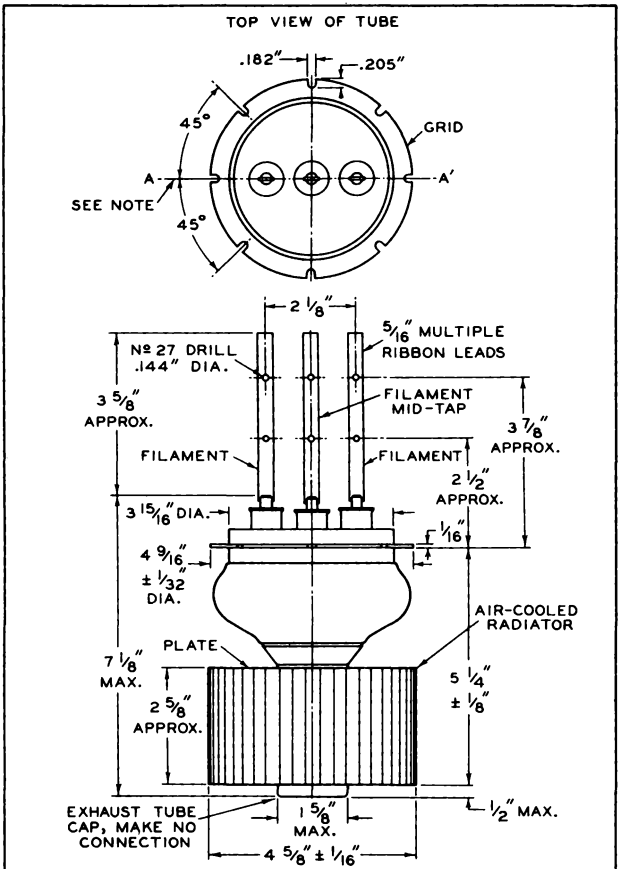
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7C24

POWER TRIODE



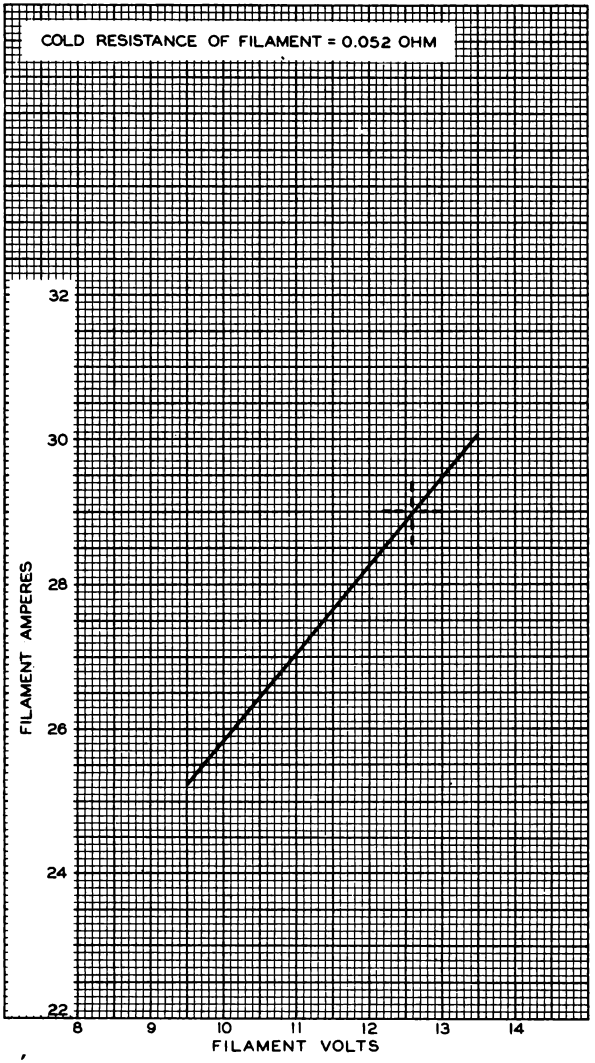
NOTE: PLANE OF FILAMENT LEADS WILL NOT DEVIATE MORE THAN 3-1/2° FROM PLANE PASSING THROUGH AA' NORMAL TO GRID FLANGE.

92CM-6606R1

7C24

7C24

AVERAGE FILAMENT CHARACTERISTIC



7C24

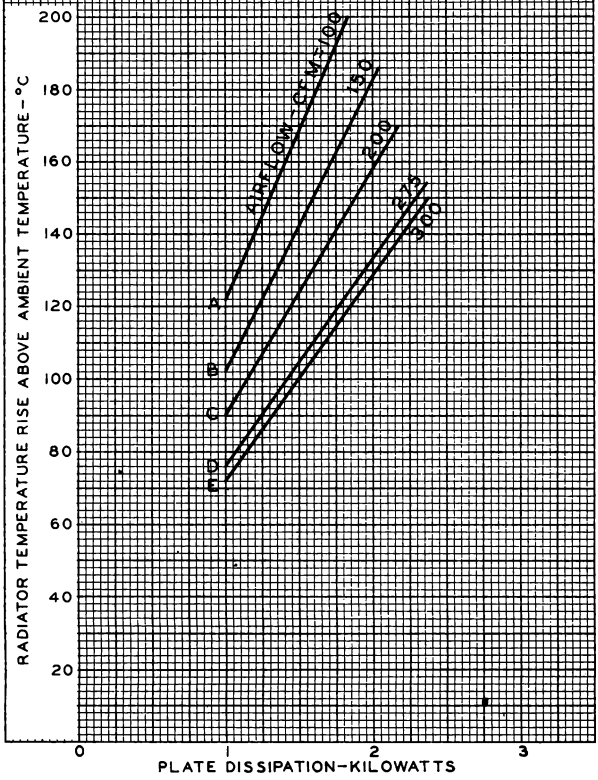
COOLING REQUIREMENTS

E_f = 12.6 VOLTS
MAXIMUM RADIATOR TEMPERATURE = 180°C

CURVE	PRESSURE DROP INCHES OF WATER
A	0.20
B	0.44
C	0.77
D	1.50
E	1.76

CURVES TAKEN ACCORDING TO NAFM* STANDARDS – BULLETIN Nº 103

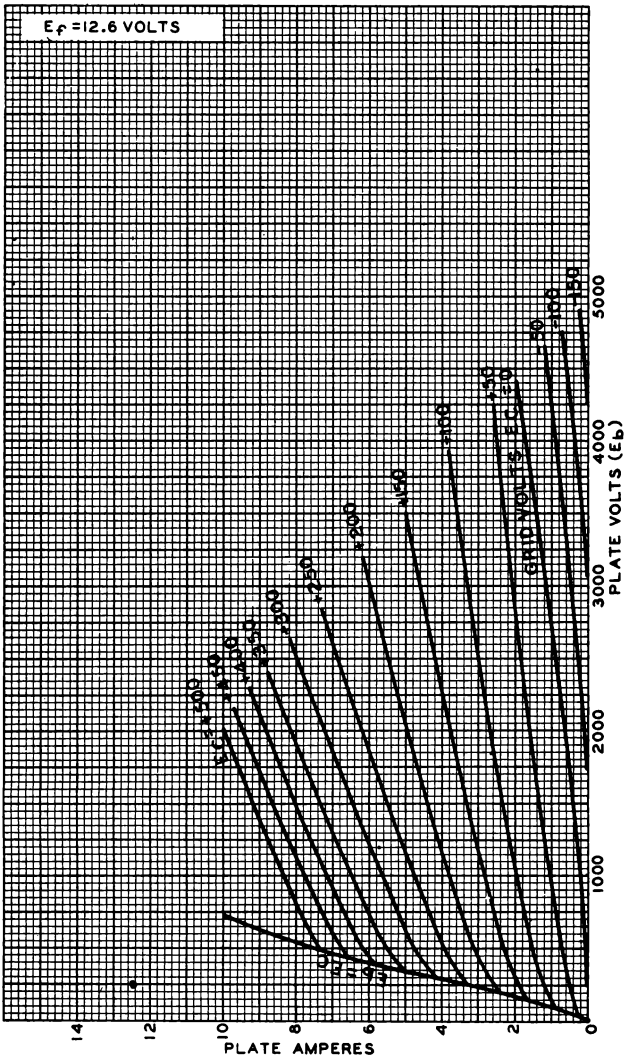
*NATIONAL ASSOCIATION OF FAN MFRS., GENERAL MOTORS BLDG., DETROIT, MICH.



7C24

7C24

AVERAGE PLATE CHARACTERISTICS



FEB.14,1947 TUBE DEPARTMENT 92CM-6647R1

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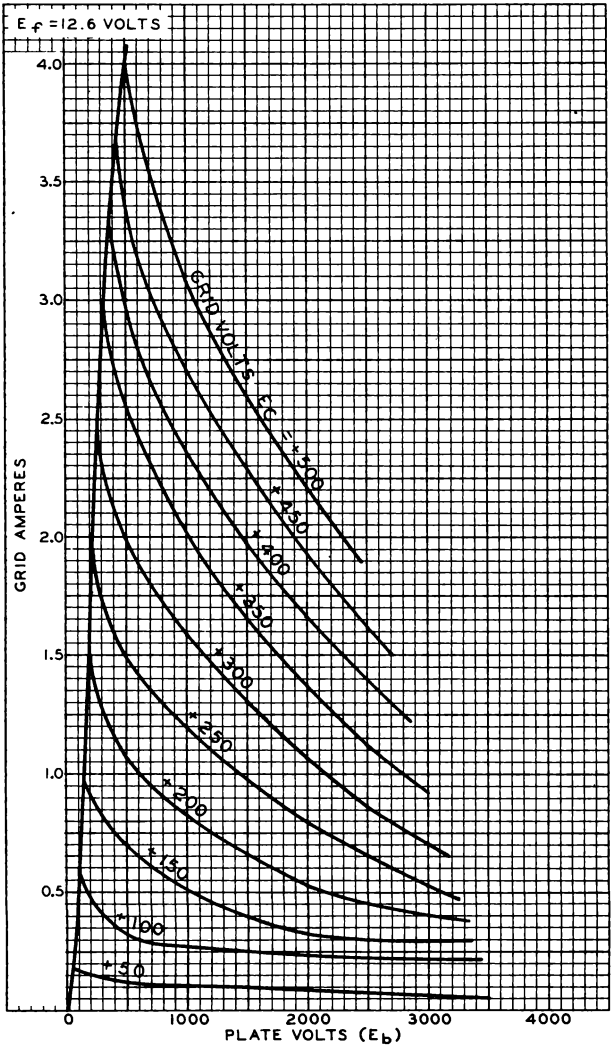
7C24

TYPICAL GRID CHARACTERISTICS

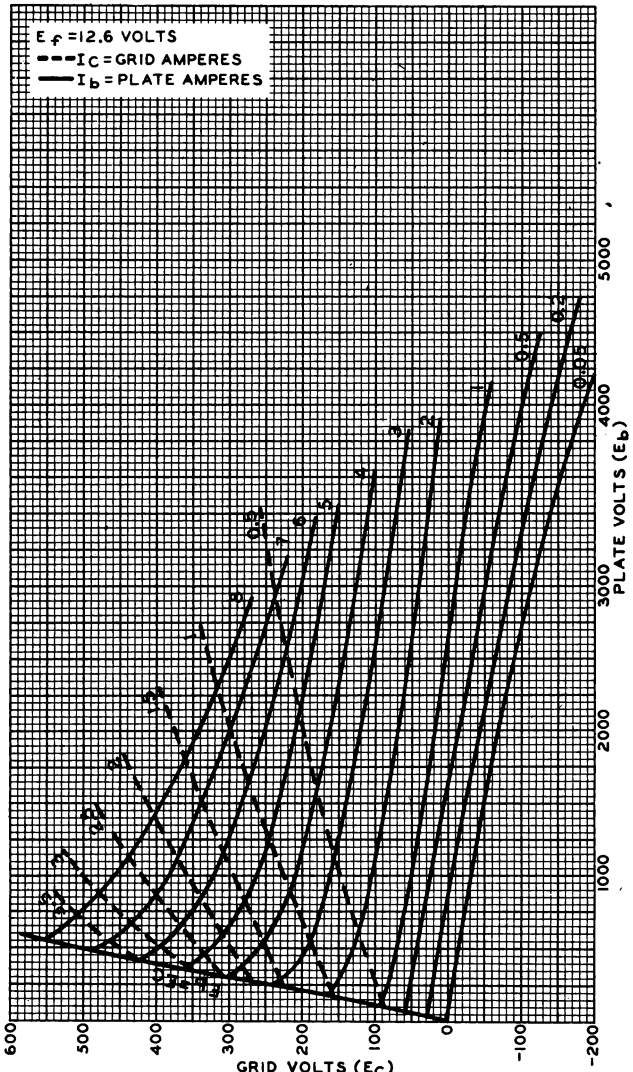


7C24

RCA

7C24

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



FEB.10,1947

TUBE DEPARTMENT

92CM-6666R1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

8D21
PUSH-PULL POWER TETRODE
WATER AND FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament, Thoria-Coated:

Voltage (AC or DC)	3.2 av., 3.4 max. volts. See DATA 3 for operating instructions on conserving filament life.	←
Current, with 3.2 volts on filament. . .	125	amp
Starting Current	Must never exceed 220 amperes, even momentarily	
Cold Resistance.	0.0077	ohm
Minimum Heating Time	5	sec
Mu-Factor, Grid No.2 to Grid No.1 (Each Unit)	5	
Direct Interelectrode Capacitances (Each Unit):*		←
Grid No.1 to Plate	**	
Input.	25.5	μμf
Output	6.5	μμf
Internal Grid-No.2 Bypass Capacitor (Approx.). . .	200	μμf

Mechanical:

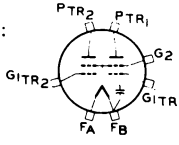
Terminal Connections:

F_A - Filament

F_B - Fil., Mounting Flange

G_{1TR_1} - Grid No.1 of Tetrode #1

G_{1TR_2} - Grid No.1 of Tetrode #2



G_2 - Grid No.2 of Tetrodes #1 & #2

P_{1TR_1} - Plate of Tetrode #1

P_{1TR_2} - Plate of Tetrode #2

Mounting Position. . . Plane of grid-No.1 leads horizontal and below horizontal plane of plate leads

Maximum Overall Length . . . . . 12-9/32"

Maximum Diameter . . . . . 5-3/4"

Air Cooling: ←

Forced-air cooling of the glass envelope is required. The air flow must start with application of plate voltage, and should be directed from a 2"-diameter nozzle at the plate end of the tube so as to cool the area between the plate seals as well as the sides of the glass envelope. The air flow may be removed simultaneously with removal of plate voltage. Interlocking of the air flow with the power supplies is recommended to prevent the application of voltages to the tube without air cooling.

Air Flow	40 min.	cfm
Bulb and Seal Temperature.	150 max.	°C

Water Cooling: ←

Water cooling of the filament block, the No.1 grids, the No.2 grids, and the plates is required. The water flow must start before application of any voltages and preferably should continue for several seconds after removal of all voltages. Interlocking of the water flow through each of the electrodes with all power supplies is recommended to prevent tube damage in case of failure of adequate water flow.

*,**: See next page. ← Indicates a change.

8D21
PUSH-PULL POWER TETRODE

→ Water Cooling (Continued):

Water Flow Required:		
Filament Block, Cooling pipes in series.	0.1 min.	gpm
No.1 Grids, Cooling pipes in series. .	0.1 min.	gpm
No.2 Grids	0.1 min.	gpm
Plate of Each Unit:		
With dissipation of 1.5 kw	0.3 min.	gpm
With dissipation of 2.25 kw	0.4 min.	gpm
With dissipation of 3 kw	0.5 min.	gpm

Water Flow Obtained with Pressure Drop of 60 psi:

	Min.	*Max.*	
Filament Block, Cooling pipes in series	0.18	0.37	gpm
No.1 Grids, Cooling pipes in series.	0.18	0.35	gpm
No.2 Grids	0.18	0.38	gpm
Plate of Each Unit	0.55	1.00	gpm
Water Pressure		100 max.	psi
Minimum Recommended Value.		60	psi
Outlet Water Temperature		70 max.	°C

GRID-MODULATED PUSH-PULL RF POWER AMPLIFIER—

Class C Television Service

Synchronizing-Level Conditions unless otherwise noted;
Values are total for both units

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	6000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	1000 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE—White Level. . .	-1000 max.	volts
→ DC PLATE CURRENT (At Crest of Modulation)	2 max.	amp
PLATE INPUT.	10000 max.	watts
GRID-No.2 INPUT.	400 max.	watts
PLATE DISSIPATION.	6000 max.	watts
GRID-No.1 DISSIPATION.	50 max.	watts

Typical Operation in Television Service up to 216 Mc—Bandwidth of 6 Mc:

DC Plate Voltage	5000 . .	volts
DC Grid-No.2 Voltage	800 . .	volts
DC Grid-No.1 Voltage:		
Synchronizing Level.	-220 . .	volts
→ Pedestal Level	-400 . .	volts
→ White Level.	-820 . .	volts
Peak RF Grid-No.1-to-Grid-No.1 Voltage .	1300 . .	volts
→ DC Plate Current:		
Synchronizing Level.	1.9 . .	amp
Pedestal Level	1.45 . .	amp
DC Grid-No.2 Current:		
Pedestal Level	-0.025 . .	amp

*,**,●: See next page. →Indicates a change.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

8D21
PUSH-PULL POWER TETRODE

DC Grid-No.1 Current:			
Synchronizing Level	0.050	..	amp
Pedestal Level	0.010	..	amp
Driving Power (Approx.)*	300 to 500		watts ←
Power Output:			←
Synchronizing Level	5300	..	watts
Pedestal Level	3100	..	watts

PUSH-PULL RF POWER AMPLIFIER—

Class C Telegraphy or FM Telephony ←

Key-down conditions without amplitude modulation;
Values are total for both units

Maximum CCS● Ratings, ***Absolute Values*:**

DC PLATE VOLTAGE	6000	max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	1000	max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-1000	max.	volts
DC PLATE CURRENT	2	max.	amp
PLATE INPUT	10000	max.	watts
GRID-No.2 INPUT	400	max.	watts
PLATE DISSIPATION	6000	max.	watts
GRID-No.1 DISSIPATION	50	max.	watts

Typical Operation in CW Service at 300 Mc:

DC Plate Voltage	6000	..	volts
DC Grid-No.2 Voltage	800	..	volts
DC Grid-No.1 Voltage▲	-275	..	volts
Peak RF Grid-No.1-to-Grid-No.1 Voltage	1350	..	volts
DC Plate Current	1.6	..	amp
DC Grid-No.2 Current	0.040	..	amp
DC Grid-No.1 Current (Approx.)	0.085	..	amp
Driving Power (Approx.)	500	..	watts
Power Output (Approx.)	6500	..	watts

Typical Operation in FM Service up to 216 Mc:

DC Plate Voltage	4500	..	volts
DC Grid-No.2 Voltage	700	..	volts
DC Grid-No.1 Voltage	-300	..	volts
Peak RF Grid-No.1-to-Grid-No.1 Voltage	1150	..	volts
DC Plate Current	1	..	amp
DC Grid-No.2 Current	0.050	..	amp
DC Grid-No.1 Current (Approx.)	0	..	amp
Driving Power (Approx.)	400	..	watts
Power Output (Approx.)	2500	..	watts

Maximum Circuit Values (CW or FM Service):

Grid-No.1-Circuit Resistance	6000	max.	ohms

*,**,●,★,▲: See next page. ← Indicates a change.

8D21
PUSH-PULL POWER TETRODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Values are for each unit, unless otherwise indicated

	Note	Min.	Max.	
Filament Current	1	110	140	amp
Input Capacitance.	–	22.5	28.5	μμf
Output Capacitance	–	5.3	7.7	μμf
Plate Current.	1,2	–	0.1	amp
Plate Current.	1,3	3.0	5.0	amp
Plate Current Average of Both Units. . .	1,3	3.25	–	amp
Grid-No.1 Current.	1,3	-0.15	+0.40	amp
Grid-No.1 Current Average of Both Units. . .	1,3	–	0.25	amp
Grid-No.2 Current.	1,3	–	1.5	amp
Grid-No.2 Current.	1,4	–	0.15	amp
Grid-No.2 Current Average of Both Units. . .	1,4	–	0.10	amp
Peak Cathode Current . . .	1,5	7	–	amp

Note 1: AC filament volts = 3.2.

Note 2: With dc plate voltage of 5000 volts; dc grid-No.2 voltage of 800 volts; and dc grid-No.1 voltage of -220 volts.

Note 3: With dc plate voltage of 1500 volts; dc grid-No.2 voltage of 800 volts; and dc grid-No.1 voltage of +500 volts.

Note 4: With dc plate voltage of 2500 volts; dc grid-No.2 voltage of 800 volts; and dc grid-No.1 voltage of +300 volts.

Note 5: Designers should limit the maximum usable cathode current to this value.

* With no external shielding.

** Grid-No.1-to-plate capacitance is internally neutralized by the tube structure to within 0.02 μμf.

● Continuous Commercial Service.

★ Driving power is accounted for largely by circuit losses and is less at lower frequencies. In practical, grid-modulated circuit design with damping resistors, the indicated driving power, depending on frequency, is required to take care of losses in the damping resistors, the circuit losses, and the tube driving power.

▲ Obtained from combination of fixed bias and a grid-No.1 resistor of 2500 to 3000 ohms.

Data on operating frequencies for the 8D21 are given on the sheet TRANS.TUBE RATINGS vs FREQUENCY.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

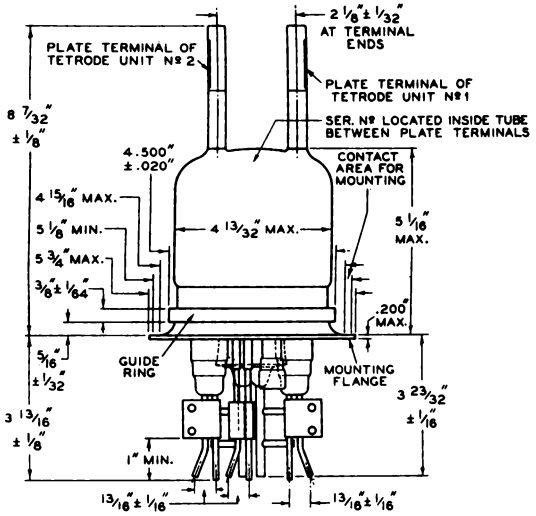
8D21
PUSH-PULL POWER TETRODE

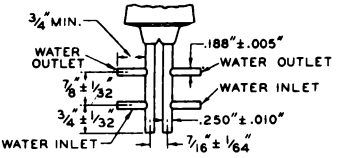
OPERATING INSTRUCTIONS FOR CONSERVING FILAMENT LIFE

Filament life of the 8D21 can be conserved by operating its filament at the lowest voltage which will give the desired power output. Because the filament of this tube when operated at the tabulated value of 3.2 volts provides emission usually in excess of any requirements within ratings, it is recommended that the filament voltage be reduced below 3.2 volts to a value that will give adequate but not excessive emission for any particular application. The proper operating value may be found by reducing the filament voltage, with normal modulation applied to the transmitter, until a reduction in output is observed. The filament voltage must then be increased by an amount equivalent to the maximum percentage regulation of the filament-voltage supply, and then further increased by about 0.1 volt to allow for other variations. It is suggested that the adjustment procedure be carried out daily. However, if no significant changes in the operating voltage are found necessary, the adjustment procedure can be scheduled less frequently. Good regulation of the filament voltage is in general economically advantageous from the viewpoint of tube life.

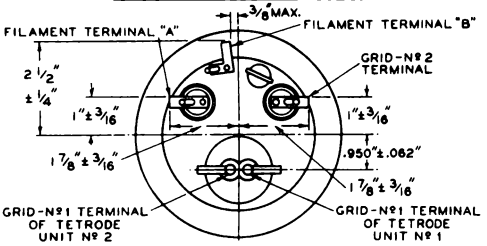
8D21

8D21
PUSH-PULL POWER TETRODE





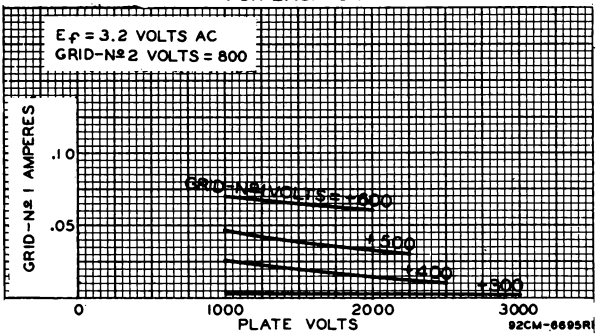
DETAIL OF GRID-Nº1 TERMINALS



8D21

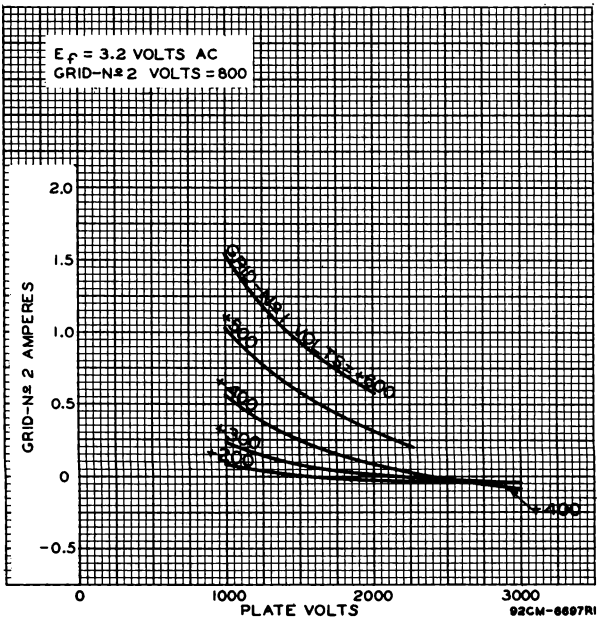
TYPICAL CHARACTERISTICS

FOR EACH UNIT



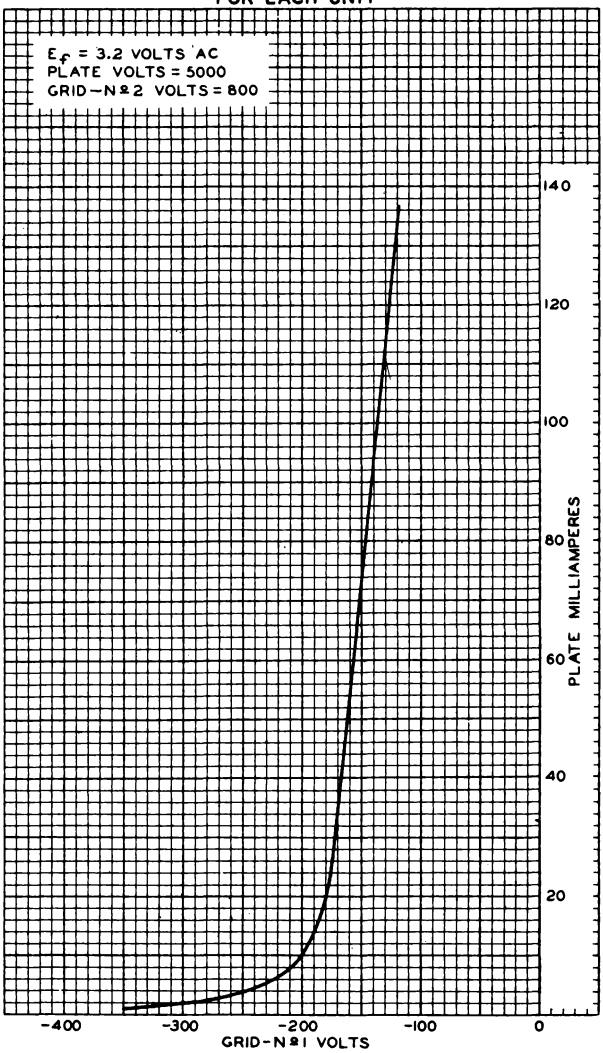
TYPICAL CHARACTERISTICS

FOR EACH UNIT



8D21

8D21
AVERAGE CHARACTERISTIC
FOR EACH UNIT



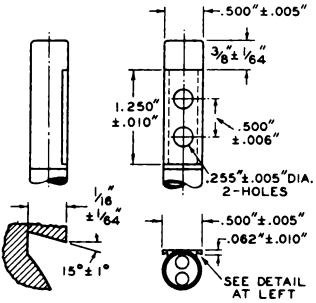
MAY 27, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

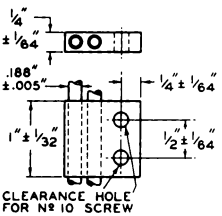
92CM-6990

8D21
PUSH-PULL POWER TETRODE

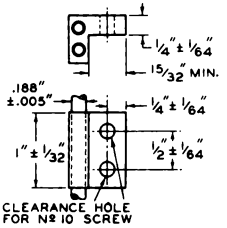
OUTLINE DETAILS



DETAIL OF PLATE TERMINALS



DETAIL OF FILAMENT TERMINAL "A" AND GRID-Nº 2 TERMINAL



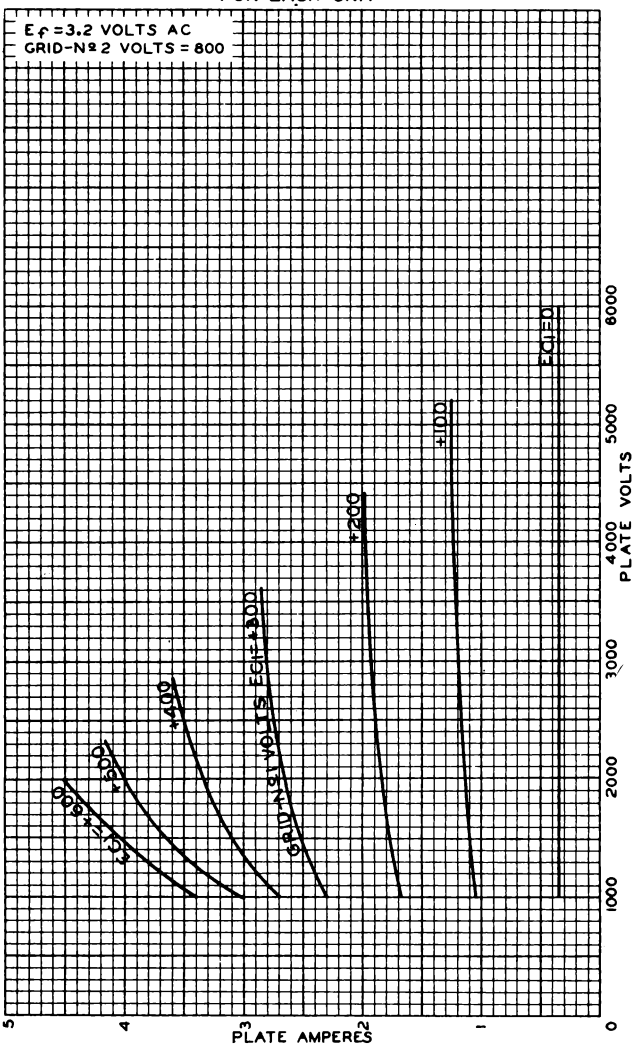
DETAIL OF FILAMENT TERMINAL "B"

8D21

8D21

AVERAGE PLATE CHARACTERISTICS

FOR EACH UNIT



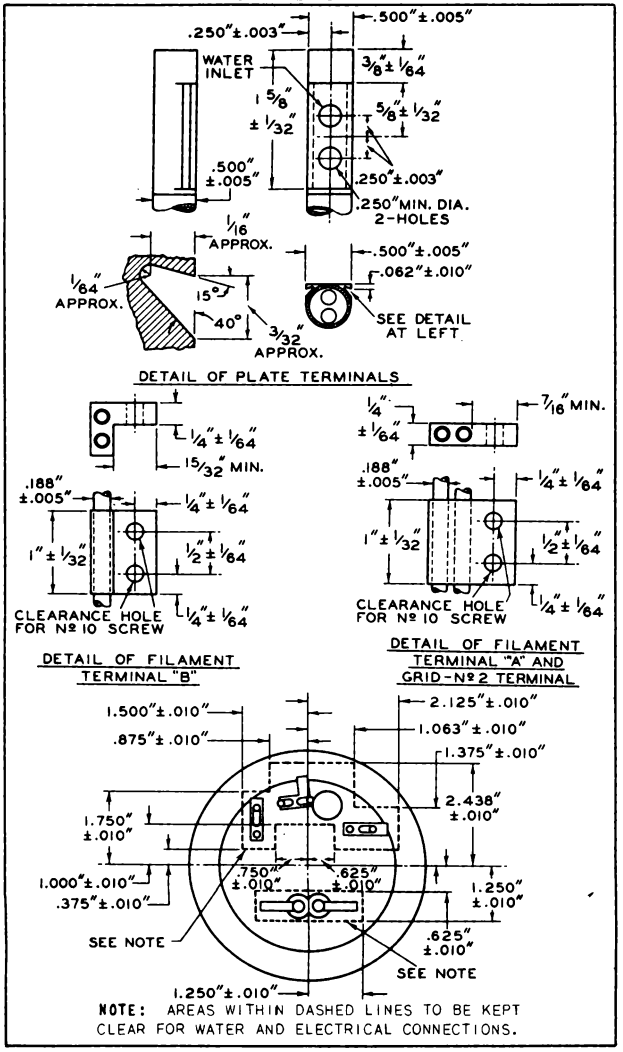
MAY 25, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6696R1

8D21
PUSH-PULL POWER TETRODE

OUTLINE DETAILS



NOTE: AREAS WITHIN DASHED LINES TO BE KEPT CLEAR FOR WATER AND ELECTRICAL CONNECTIONS.

9C21

POWER TRIODE

WATER- & FORCED-AIR-COOLED

GENERAL DATA

Electrical:

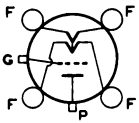
Filament, Multistrand Tungsten:

Excitation . . .	Single Phase AC or DC		
Voltage.	19.5	. . . . .	ac or dc volts
Current.	415	. . . . .	amp
Starting Current:	The filament current must never exceed 750 amperes, even momentarily.		
Cold Resistance. . . .	0.0042	. . . . .	ohm ←
Amplification Factor . .	36		←
Direct Interelectrode Capacitances (Approx.):			←
Grid to Plate.	46	. . . . .	μμf
Grid to Filament . . .	100	. . . . .	μμf
Plate to Filament. . .	2.0	. . . . .	μμf

Mechanical:

Terminal Connections:

F – Filament
G – Grid–Flange Terminal



P – Water–Cooled Plate Terminal

DIAMETRICALLY OPPOSITE TERMINALS MUST BE CONNECTED TOGETHER

Mounting Position.	Vertical, Filament End Up
Maximum Overall Length	24-1/2"
Maximum Diameter	9-1/2"
Water Jacket	RCA MI – 19460 ←
Gasket	RCA MI – 27001 ←
Water Flow	15 to 20 gpm

The water flow must start before the application of any voltages and must continue for at least 2 minutes after the removal of all voltages.

Air Flow:

To Filament Seals.	10 min.	cfm

The specified air flow directed by a nozzle of 1-1/4" diameter into the filament header is required before and during the application of any voltages to limit the temperature of the filament seals to the maximum value. ←

To Plate Seal and Bulb	250	cfm

The specified air flow at a pressure of 1.3 inches of water must be directed at and distributed uniformly around the plate seal and bulb to limit the temperature of each to its maximum value at the hottest point. ←

Outlet Water Temperature	70 max.	°C
Bulb Temperature	180 max.	°C
Seal Temperature (Filament, grid, plate) . . .	165 max.	°C ←

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	15000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*.	6 max.	amp
MAX.-SIGNAL PLATE INPUT*	90 max.	kw
PLATE DISSIPATION*	40 max.	kw

● *: See next page. ← Indicates a change.

9C21

9C21
POWER TRIODE

Typical Operation:

Unless otherwise specified, values are for 2 tubes

DC Plate Voltage	10200	14000	volts
DC Grid Voltage	-220	-300	volts
Peak AF Grid-to-Grid Voltage	850	1050	volts
Zero-Signal DC Plate Current	0.6	0.6	amp
Max.-Signal DC Plate Current	5.7	7.1	amp
Effective Load Resistance (plate-to-plate)	3600	4000	ohms
Max.-Signal Driving Power (Approx.)#	110	150	watts
Max.-Signal Power Output (Approx.)	36	61	kw

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	12500 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	4 max.	amp
→ DC GRID CURRENT	1.5 max.	amp
PLATE INPUT	50 max.	kw
PLATE DISSIPATION	28 max.	kw

Typical Operation:

DC Plate Voltage	10200	12500	volts
DC Grid Voltage●	-1500	-1670	volts
	2000	2100	ohms
Peak RF Grid Voltage	1960	2190	volts
DC Plate Current	3.1	3.5	amp
DC Grid Current (Approx.)□	0.75	0.79	amp
Driving Power (Approx.)□	1320	1570	watts
Power Output (Approx.)	27.5	38	kw

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	17000 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	9 max.	amp
→ DC GRID CURRENT	1.5 max.	amp
PLATE INPUT	150 max.	kw
PLATE DISSIPATION	40 max.	kw

Typical Operation:

DC Plate Voltage	14000	17000	volts
DC Grid Voltage▲▲	-1500	-1600	volts
	230	180	ohms
	1800	1780	ohms

●,*,#,●,□,□□,▲▲: See next page. →Indicates a change.

9C21
POWER TRIODE

Peak RF Grid Voltage	2000	2200	volts
DC Plate Current	5.8	7.9	amp
DC Grid Current (Approx.).	0.83	0.9	amp
Driving Power (Approx.).	1500	1800	watts
Power Output (Approx.)	61	100	kw

● Continuous Commercial Service.

* Averaged over any audio-frequency cycle of sine-wave form.

✱ The driving stage should have good regulation and should be capable of supplying considerably more than the specified driving power.

⊕ Obtained by grid resistor (2000, 2100) or by partial self-bias methods.

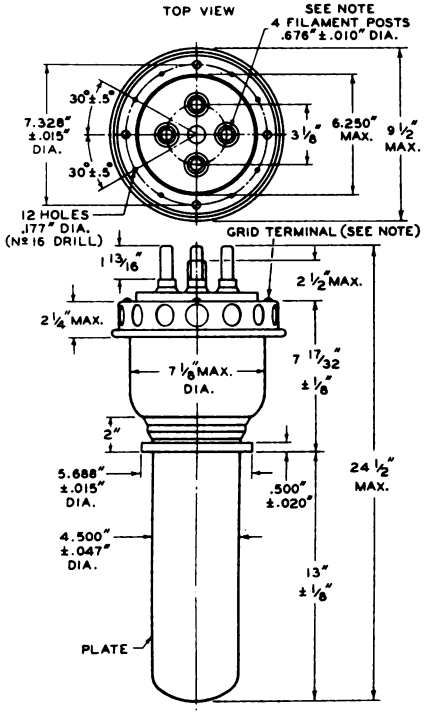
□ Subject to wide variations as explained under TUBE RATINGS in General Section.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

▲▲ Obtained from cathode resistor (230, 180), or grid resistor (1800, 1780) or by partial self-bias methods.

Data on operating frequencies for the 9C21 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

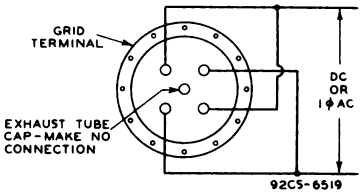
9C21
POWER TRIODE



NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

92CM-6438R1

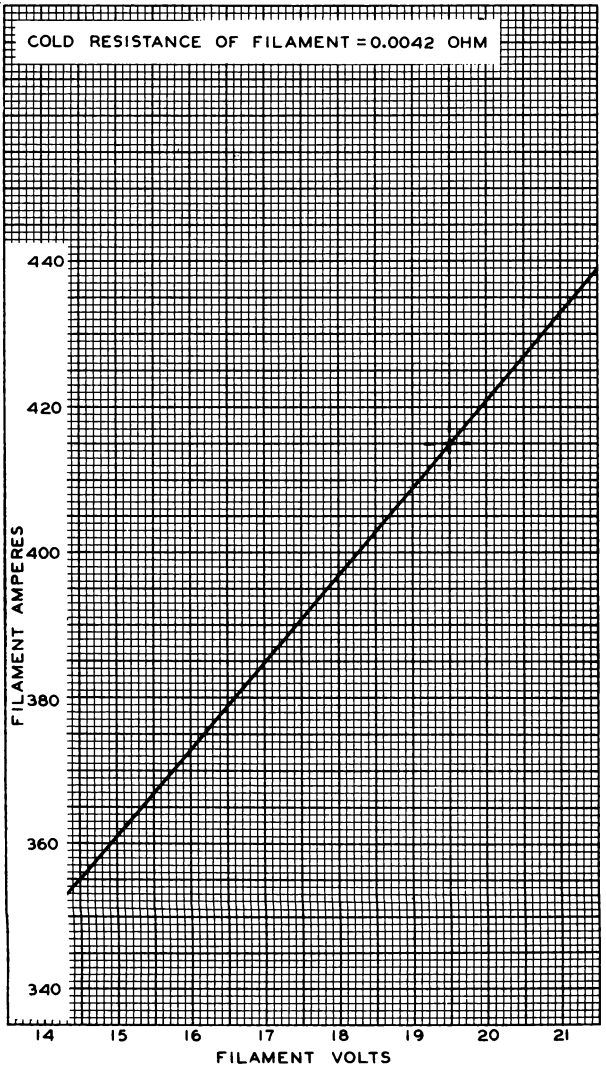
FILAMENT CONNECTIONS



92CS-6519

9C21

AVERAGE FILAMENT CHARACTERISTIC



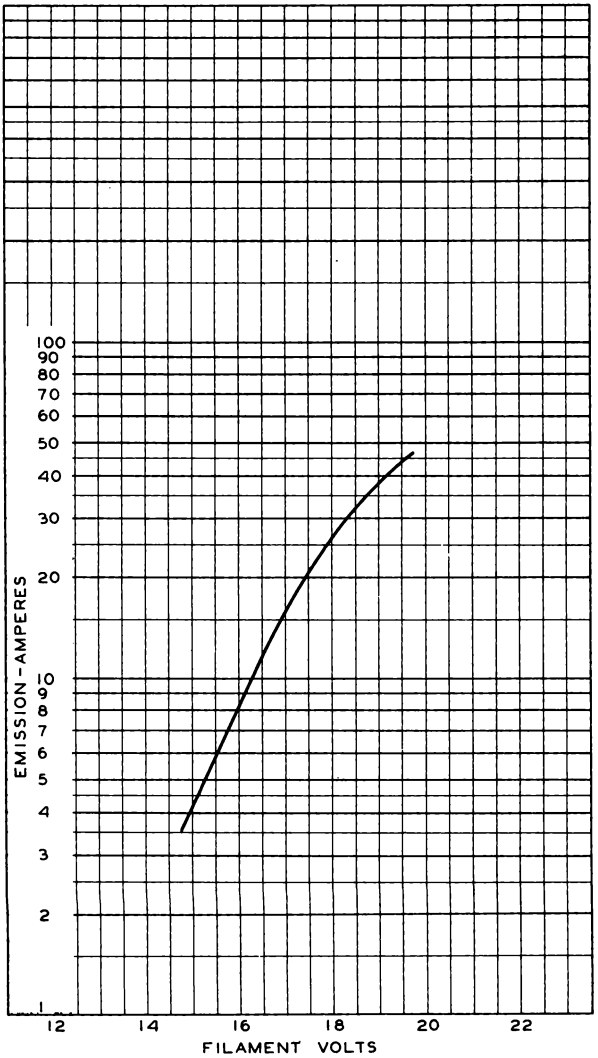
DEC. 1, 1943

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6457

9C21

AVERAGE FILAMENT-EMISSION CHARACTERISTIC



DEC. 1, 1943

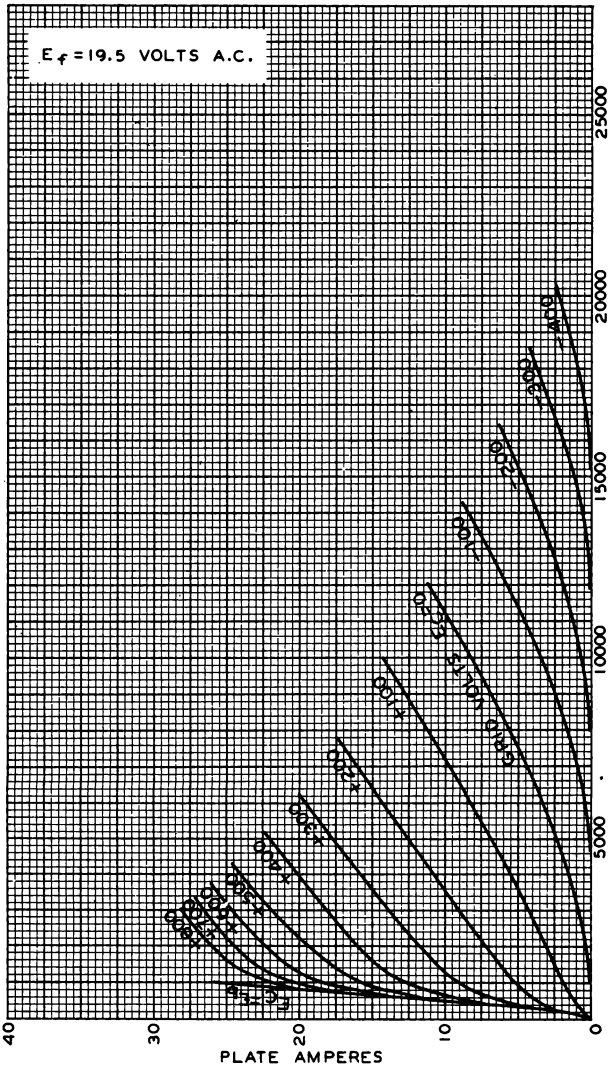
RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6458

9C21

9C21

AVERAGE PLATE CHARACTERISTICS



DEC. 1, 1943

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6461

9C21

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

DEC. 1, 1943

RCA VICTOR DIVISION

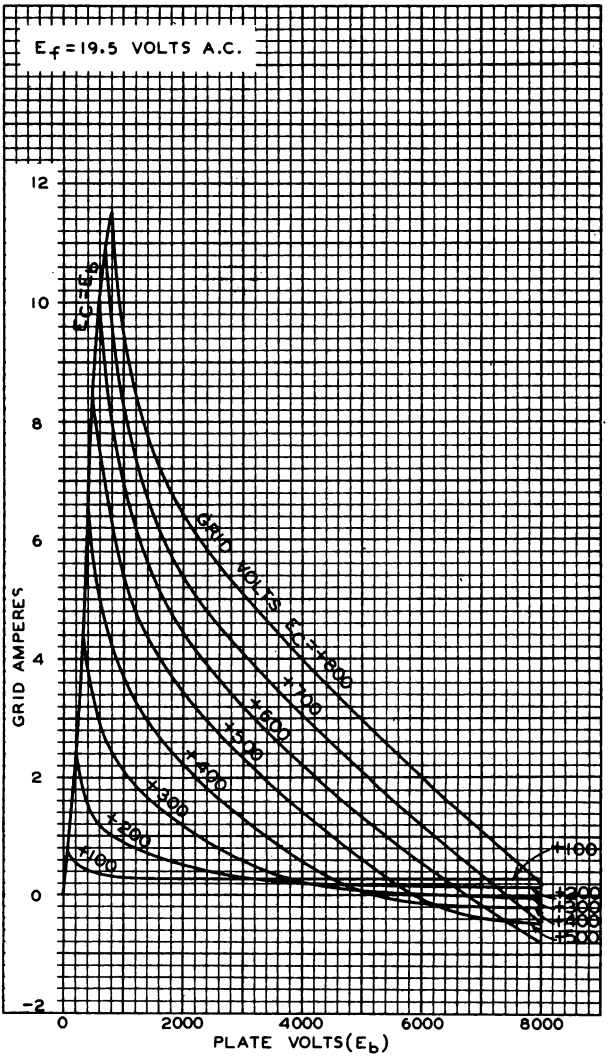
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6462

9C21

9C21

TYPICAL CHARACTERISTICS



DEC. 1, 1943

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6463

9C22
POWER TRIODE

FORCED-AIR-COOLED

GENERAL DATA

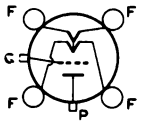
Electrical:

Filament, Multistrand Tungsten:

Excitation . . .	Single Phase AC or DC		
Voltage.	19.5	. . . . .	ac or dc volts
Current.	415	. . . . .	amp
Starting Current:	The filament current should never exceed 750 amperes, even momentarily.		
Cold Resistance. . . .	0.0042	. . . . .	ohm
Amplification Factor . .	41		
Direct Interelectrode Capacitances (Approx.):			
Grid to Plate.	50	. . . . .	μμf
Grid to Filament . . .	100	. . . . .	μμf
Plate to Filament. . .	2.2	. . . . .	μμf

Mechanical:

Terminal Connections:



F - Filament
G - Grid-Flange Terminal

P - Radiator-Cooled Plate Terminal

DIAMETRICALLY OPPOSITE TERMINALS MUST BE CONNECTED TOGETHER

Mounting Position.	Vertical, Filament End Up	
Maximum Overall Length	25"	
Maximum Diameter	17"	
Radiator	Integral Part of Tube	
Air Flow:		
Through Radiator (For max. ratings). .	1800 min.	cfm
The specified air flow at a pressure of 2.2 inches of water should be delivered by a blower vertically upward through the radiator before and during the application of any voltages.		
To Filament Seals.	10 min.	cfm
The specified air flow directed by a nozzle of 1-1/4" diameter downward into the filament header is required before and during the application of any voltages in order to limit the temperature of the filament seals to the maximum value.		
Input Air Temperature (To radiator). . .	45 max.	°C
Radiator Temperature (Measured at core upper end, away from incoming air) . .	180 max.	°C
Seal Temperature (Filament, grid, plate)	165 max.	°C

Fittings:

Filament Connectors.	RCA No.217F1
Bracelet (For Boot).	RCA No.227F1
Plate Connector.	RCA No.238F1
Air Jacket	RCA No.241F1

← Indicates a change.

9C22

9C22
POWER TRIODE

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	15000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	6 max.	amp
MAX.-SIGNAL PLATE INPUT*	60 max.	kw
PLATE DISSIPATION*	20 max.	kw

Typical Operation:

Unless otherwise specified, values are for 2 tubes

DC Plate Voltage	10200	14000	volts
DC Grid Voltage	-220	-300	volts
Peak AF Grid-to-Grid Voltage	850	1050	volts
Zero-Signal DC Plate Current	0.6	0.6	amp
Max.-Signal DC Plate Current	5.7	7.1	amp
Effective Load Resistance (Plate-to-plate)	3600	4000	ohms
Max.-Signal Driving Power (Approx.)#	110	150	watts
Max.-Signal Power Output (Approx.)	36	61	kw

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	12500 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	4 max.	amp
DC GRID CURRENT	1.5 max.	amp
PLATE INPUT	50 max.	kw
PLATE DISSIPATION	14 max.	kw

Typical Operation:

DC Plate Voltage	10200	12500	volts
DC Grid Voltage⊕	-1500	-1670	volts
From a grid resistor of	2000	2100	ohms
Peak RF Grid Voltage	1960	2190	volts
DC Plate Current	3.1	3.5	amp
DC Grid Current (Approx.)□	0.75	0.79	amp
Tube Driving Power (Approx.)□	1320	1570	watts
Power Output (Approx.)	27.5	38	kw

* Averaged over any audio-frequency cycle of sine-wave form.

\# The driving stage should have good regulation and should be capable of supplying considerably more than the specified driving power.

⊕ Obtained by grid resistor of value shown or by partial self-bias methods.

●, □, See next page.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

9C22
POWER TRIODE

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	17000 max.	volts
DC GRID VOLTAGE	−2000 max.	volts
DC PLATE CURRENT	8 max.	amp
DC GRID CURRENT	1.5 max.	amp
PLATE INPUT	100 max.	kw
PLATE DISSIPATION	20 max.	kw

Typical Operation:

DC Plate Voltage	14000	17000	volts
DC Grid Voltage▲▲	−1500	−1600	volts
From a grid resistor of	1800	2000	ohms
From a cathode resistor of	230	275	ohms
Peak RF Grid Voltage	2000	2050	volts
DC Plate Current	5.8	5	amp
DC Grid Current (Approx.)□	0.83	0.8	amp
Tube Driving Power (Approx.)□	1500	1450	watts
Power Output (Approx.)	61	65	kw

● Continuous Commercial Service.

□ For effect of load resistance on grid current and driving power, refer to TUBE RATINGS--*Grid Current and Driving Power* in General Section.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

▲▲ Obtained from cathode resistor, from grid resistor, or by partial self-bias methods.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN ←

	Note	*Min.*	*Max.*	
Filament Current	1	400	430	amp
Amplification Factor	1,2	37	45	
Grid-Plate Capacitance	–	44	56	μμf
Grid-Filament Capacitance	–	82	118	μμf
Plate-Filament Capacitance	–	1.7	2.7	μμf
Plate Voltage	1,3	4600	5600	volts
Plate Voltage	1,4	8300	10100	volts
Grid Voltage	1,5	−295	−465	volts
Peak Cathode Current	1,6	40	–	amp
Useful Power Output	1,7	50000	–	watts

Note 1: With 19.5 volts ac on filament.

Note 2: With dc grid voltage of −50 volts and dc plate voltage adjusted to give dc plate current of 2 amp.

Note 3: With dc grid voltage of 0 volts, and dc plate voltage adjusted to give dc plate current of 2 amp.

←Indicates a change.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

9C22
POWER TRIODE

Note 4: With dc grid voltage of −100 volts, and dc plate voltage adjusted to give dc plate current of 2 amp.

Note 5: With dc plate voltage of 15000 volts, and dc grid voltage adjusted to give dc plate current of 50 ma.

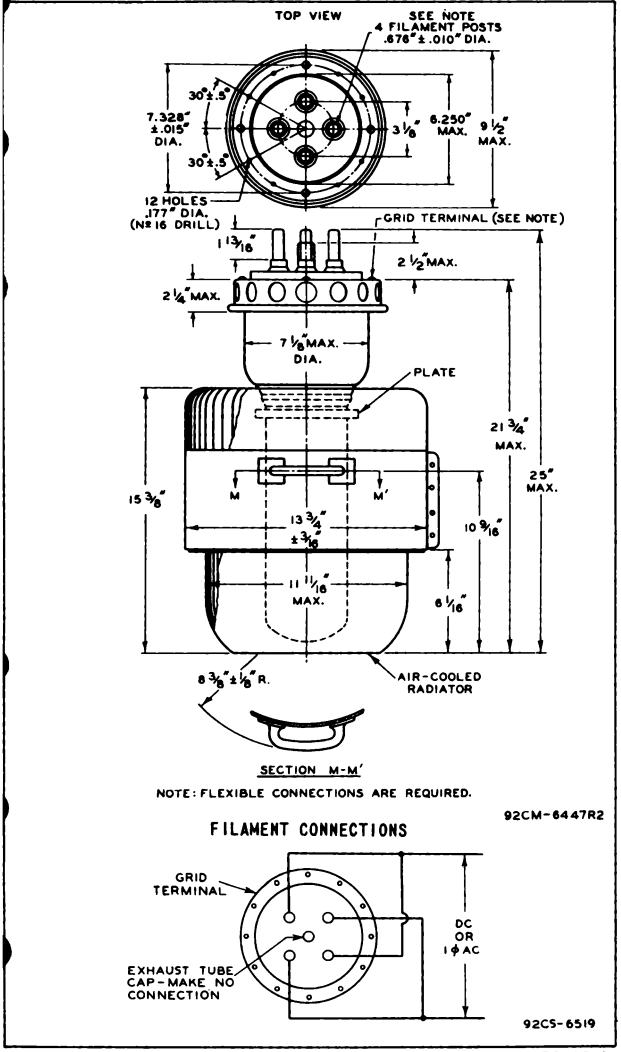
Note 6: Represents the maximum useable cathode current (plate current and grid current) for the tube under any condition of operation.

Note 7: With dc plate voltage of 13000 volts, dc plate current of 6 amp; dc grid current of 0.6 to 0.8 amp., grid resistor of 2000 ± 10% ohms, and frequency of 25 megacycles/second.

Data on operating frequencies for the 9C22 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

CURVES
for the 9C22 are the same
as those for Type 9C21

9C22
POWER TRIODE



NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

92CM-6447R2

FILAMENT CONNECTIONS

92CS-6519

9C25

POWER TRIODE

FORCED-AIR-COOLED, GROUNDED-GRID TYPE

GENERAL DATA

Electrical:

Filament, Multistrand Thoriated Tungsten:
- Excitation. . . . Single Phase AC or DC
- Voltage. . . . . 6.0 . . . . . ac or dc volts
- Current. . . . . 285 . . . . . amp
- Starting Current: The filament current should never exceed 425 amperes, even momentarily.
- Cold Resistance. . . . . 0.0025 . . . . . ohms

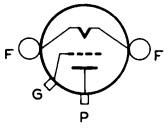
Amplification Factor . . . 32

Direct Interelectrode Capacitances (Approx.):
- Grid to Plate. . . . . 40 . . . . . μμf
- Grid to Filament . . . . 58 . . . . . μμf
- Plate to Filament. . . . 0.9 . . . . . μμf

Mechanical:

Terminal Connections:

F – Filament
G – Grid-Flange Terminal



P – Radiator-Cooled Plate Terminal

Mounting Position. . . . . Vertical, Filament End Up
Maximum Overall Length . . . . . 17-3/8"
Maximum Diameter . . . . . 14-1/4"
Radiator . . . . . Integral Part of Tube
Mounting . . . . . Special
Air Flow:
- Upward through Radiator. . . . . 1000 min. cfm

  The specified air flow at a pressure of 2 inches of water should be delivered by a blower vertically upward through the radiator before and during the application of any voltages.
- To Filament Seals. . . . . 10 cfm

  The specified air flow must be directed into the filament header before and during the application of any voltages in order to limit the temperature of the filament and grid seals to the maximum value.

Output Air Temperature (from Radiator) . . 70 max. °C
Radiator Temperature (measured in thermometer well). . 180 max. °C
Bulb Temperature . . . . . 180 max. °C
Filament-Seal Temperature. . . . . 165 max. °C

AF POWER AMPLIFIER & MODULATOR—Class B

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE . . . . . 11500 max. volts
MAX.-SIGNAL DC PLATE CURRENT*. . . . . 4 max. amp
MAX.-SIGNAL PLATE INPUT* . . . . . 40 max. kw
PLATE DISSIPATION* . . . . . 17.5 max. kw

● *: See next page.

9C25
POWER TRIODE

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	10500	volts
DC Grid Voltage	-250	volts
Peak AF Grid-to-Grid Voltage	1310	volts
Zero-Signal DC Plate Current	1.7	amp
Max.-Signal DC Plate Current	7	amp
Effective Load Resistance (plate-to-plate)	3300	ohms
Max.-Signal Driving Power (Approx.)	1500	watts
Max.-Signal Power Output (Approx.)	50	kw

RF POWER AMPLIFIER—Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	11500 max.	volts
DC PLATE CURRENT	3.2 max.	amp
PLATE INPUT	26 max.	kw
PLATE DISSIPATION	17.5 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	10000	volts
DC Grid Voltage	-230	volts
Peak RF Grid Voltage	400	volts
DC Plate Current	2.5	amp
DC Grid Current (Approx.)**	0.016	amp
Driving Power (Approx.)**o	800	watts
Power Output (Approx.)	9.2	kw

Typical Operation in Grounded-Grid Circuit:

Same values as fo Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.):		
Carrier	800	watts
Crest°	4000	watts
Power Output (Approx.)	10	kw

PLATE-MODULATED RF POWER AMPLIFIER—Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	9000 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	3.2 max.	amp
DC GRID CURRENT	0.65 max.	amp
PLATE INPUT	26 max.	kw
PLATE DISSIPATION	11.5 max.	kw

●, *, **, °: See next page.

9C25
POWER TRIODE

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	8000	volts
DC Grid Voltage:		
from a fixed supply of	-650	volts
from a grid resistor of	1280	ohms
Peak RF Grid Voltage	1100	volts
DC Plate Current	2.5	amp
DC Grid Current (Approx.)**	0.51	amp
Driving Power (Approx.)**	510	watts
Power Output (Approx.)	15.8	kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.)♦	3000	watts
Power Output (Approx.)	18	kw

RF POWER AMPLIFIER & OSCILLATOR—Class C Telegraphy

Key-down conditions per tube without amplitude modulation□

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	11500 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	4 max.	amp
DC GRID CURRENT	0.65 max.	amp
PLATE INPUT	40 max.	kw
PLATE DISSIPATION	17.5 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	10000	11000	volts
DC Grid Voltage:			
from a fixed supply of	-500	-540	volts ←
from a gria resistor of	860	900	ohms
from a cathode resistor of	125	130	ohms
Peak RF Grid Voltage	1000	1050	volts
DC Plate Current	3.5	3.6	amp
DC Grid Current (Approx.)**	0.58	0.61	amp
Driving Power (Approx.)**	515	575	watts
Power Output (Approx.)	25	29.5	kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.)	3400	3750	watts
Power Output (Approx.)	28	32.5	kw

● CCS - Continuous Commercial Service.

* Averaged over any audio-frequency cyle of sine-wave form.

**, ○, ♦, □: See next page. ← Indicates a change.

9C25
POWER TRIODE

** For effect of load resistance on grid current and driving power, refer to TUBE RATINGS - *Grid Current and Driving Power* in the General Section.

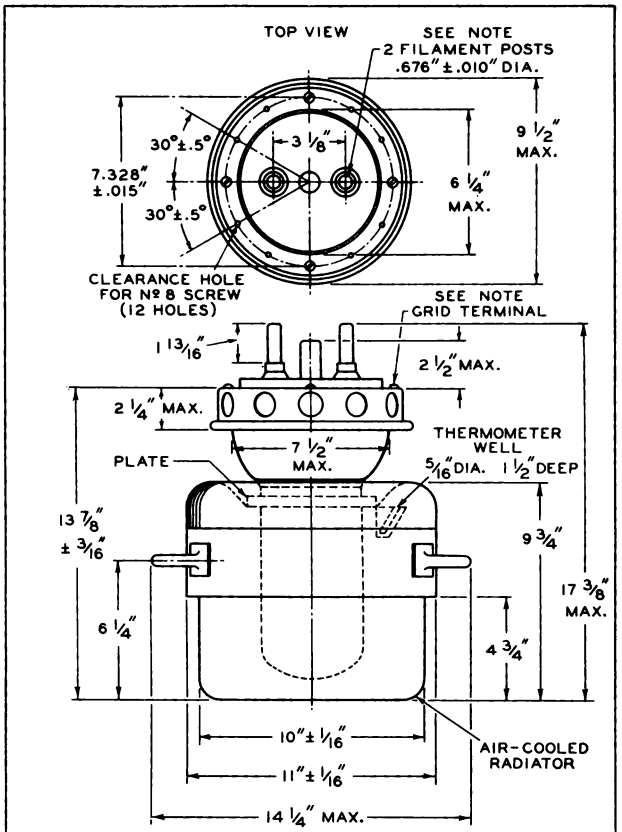
o At crest of audio-frequency cycle with modulation factor of 1.0.

Carrier power of driver modulated 100%.

□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

Data on operating frequencies for the 9C25 are given on the Sheet TRANS. TUBE RATINGS vs FREQUENCY.

9C25
POWER TRIODE



NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

92CM-6750

9C25

9C25

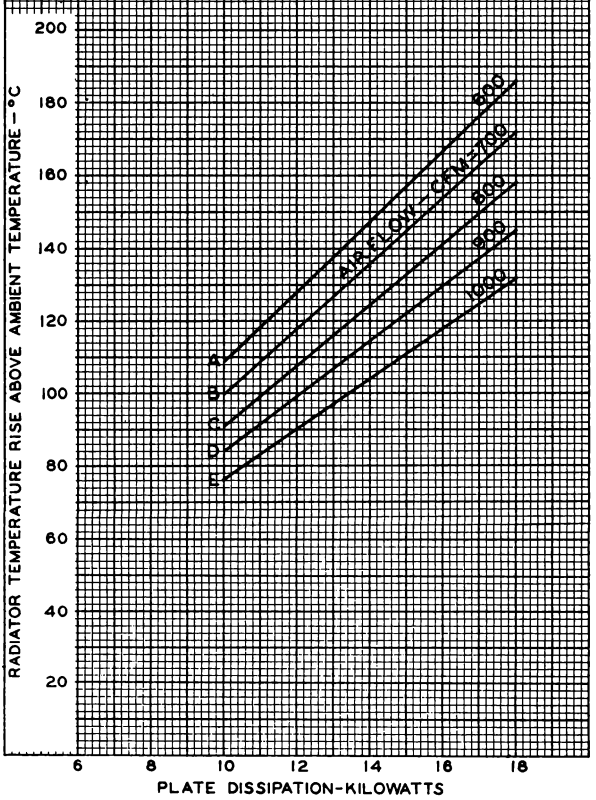
COOLING REQUIREMENTS

E_f = 6 VOLTS
MAXIMUM RADIATOR TEMPERATURE = 180°C

CURVE	PRESSURE DROP INCHES OF WATER
A	0.74
B	1.0
C	1.3
D	1.65
E	2.0

CURVES TAKEN ACCORDING TO NAFM* STANDARDS — BULLETIN Nº 103

*NATIONAL ASSOCIATION OF FAN MFGRS., GENERAL MOTORS BLDG., DETROIT, MICH.



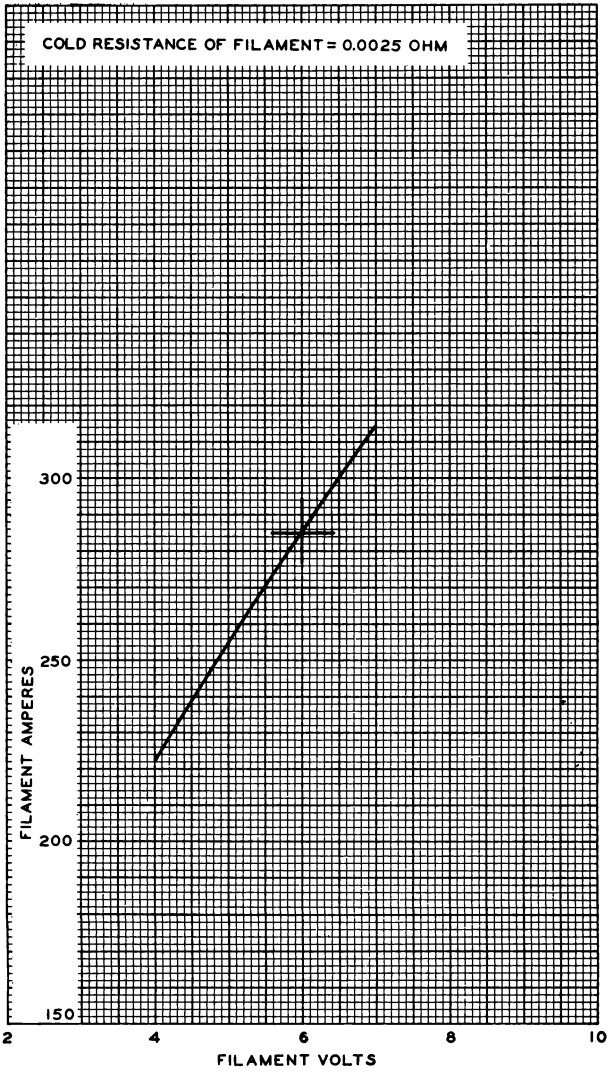
APRIL 29, 1946

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6761

9C25

AVERAGE FILAMENT CHARACTERISTIC



MAY 4,1949

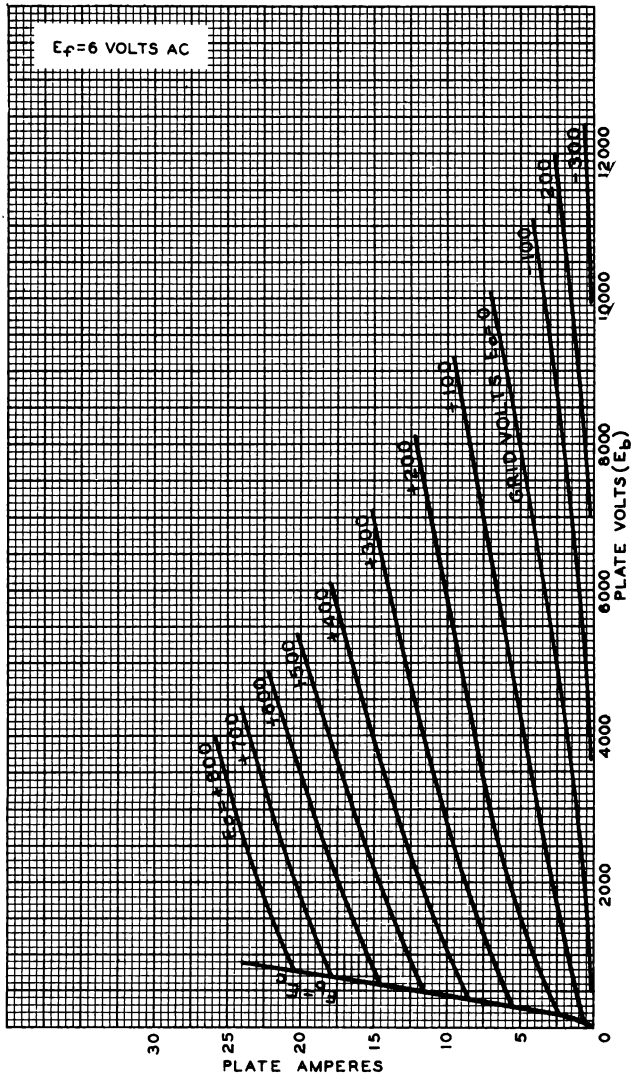
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7269

9C25

9C25

AVERAGE PLATE CHARACTERISTICS



MAY 4,1949

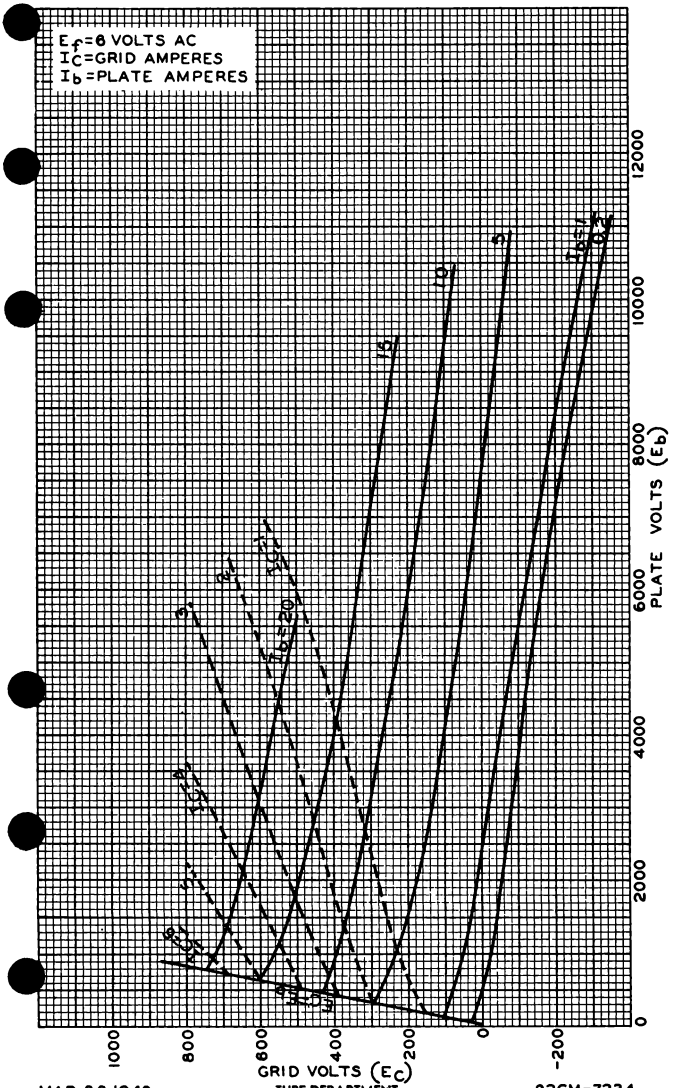
TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7270

9C25

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



MAR. 30, 1949

TUBE DEPARTMENT

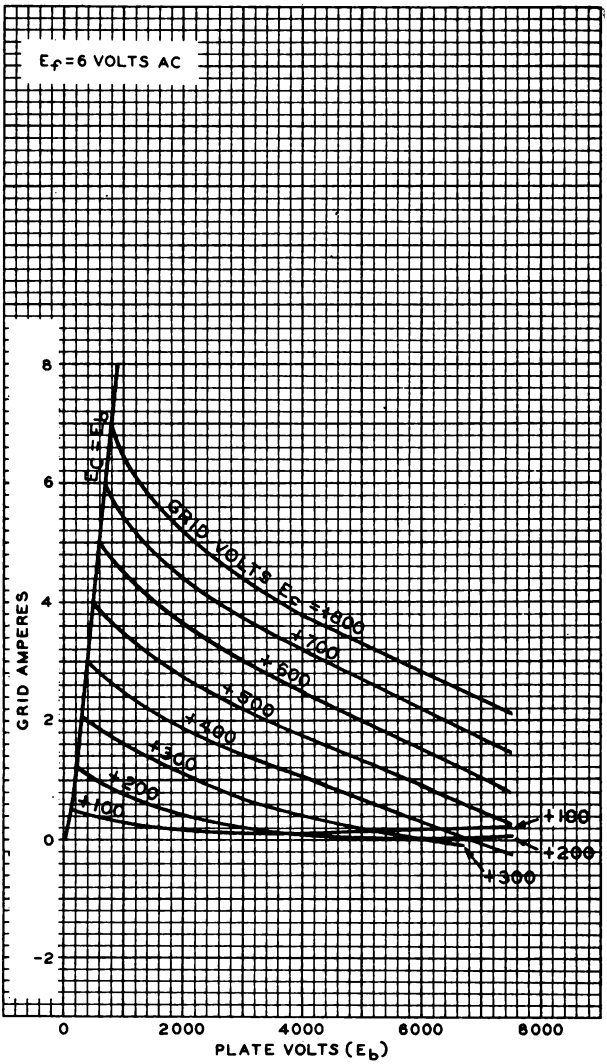
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7234

9C25

9C25

TYPICAL GRID CHARACTERISTICS



MAY 4,1949

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7272

DELETE

9C27

9C27

POWER TRIODE

WATER- & FORCED-AIR-COOLED, GROUNDED-GRID TYPE

GENERAL DATA

Electrical:

Filament, Multistrand Thoriated Tungsten:
- Excitation. . . . . Single Phase AC or DC:
- Voltage . . . . . 6.0 . . . . . ac or dc volts
- Current . . . . . 285 . . . . . amp
- Starting Current: The filament current must never exceed 425 amperes, even momentarily.
- Cold Resistance . . . . 0.0025 . . . . . ohms

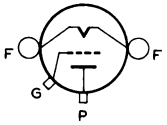
Amplification Factor. . . . 32

Direct Interelectrode Capacitances (Approx.):
- Grid to Plate . . . . . 36 . . . . . μμf
- Grid to Filament. . . . . 58 . . . . . μμf
- Plate to Filament . . . . 0.8 . . . . . μμf

Mechanical:

Terminal Connections:

F – Filament
G – Grid-Flange Terminal



P – Water-Cooled Plate Terminal

Mounting Position . . . . . Vertical, Filament End Up
Maximum Overall Length. . . . . 16-3/8"
Maximum Diameter. . . . . 9-1/2"
Water Jacket. . . . . Special
Gasket. . . . . RCA Stock No.43244
Water Flow. . . . . 12 to 15 gpm

The water flow must start before the application of any voltages and must continue for at least 2 minutes after the removal of all voltages.

Air Flow:
- To Filament Seals . . . . . 10 cfm

  The specified air flow directed into the filament header before and during the application of any voltages is required to limit the temperature of the filament seals to the maximum value.
- To Plate Seal and Bulb. . . . . 250 cfm

  The specified air flow must be directed at and distributed uniformly around the plate seal and bulb to limit the temperature of each to its maximum value at the hottest point.

Outlet Water Temperature. . . . . 70 max. °C
Bulb Temperature. . . . . 180 max. °C
Seal Temperature (Filament & Plate) . . . . . 165 max. °C

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE. . . . . 11500 max. volts
MAX-SIGNAL DC PLATE CURRENT*. . . . . 4 max. amp
MAX-SIGNAL PLATE INPUT* . . . . . 40 max. kw
PLATE DISSIPATION*. . . . . 25 max. kw

●,*: See next page.

9C27

DELETE

9C27
POWER TRIODE

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	10500	volts
DC Grid Voltage	-250	volts
Peak AF Grid-to-Grid Voltage	1310	volts
Zero-Signal DC Plate Current	1.7	amp
Max.-Signal DC Plate Current	7	amp
Effective Load Resistance (plate-to-plate)	3300	ohms
Max.-Signal Driving Power (Approx.)	1500	watts
Max.-Signal Power Output (Approx.)	50	kw

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	11500 max.	volts
DC PLATE CURRENT	3.5 max.	amp
PLATE INPUT	36 max.	kw
PLATE DISSIPATION	25 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	10000	volts
DC Grid Voltage	-230	volts
Peak RF Grid Voltage	400	volts
DC Plate Current	2.5	amp
DC Grid Current (Approx.)**	0.016	amp
Driving Power (Approx.)**o	800	watts
Power Output (Approx.)	9.2	kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.):		
Carrier	800	watts
Crest°	4000	watts
Power Output (Approx.)	10	kw

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	9000 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	3.2 max.	amp
DC GRID CURRENT	0.65 max.	amp
PLATE INPUT	26 max.	kw
PLATE DISSIPATION	15 max.	kw

●, *, **, °: See next page.

Draft

9C27

9C27
POWER TRIODE

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	8000		volts
DC Grid Voltage:			
from a fixed supply of	-650		volts
from a grid resistor of	1280		ohms
Peak RF Grid Voltage	1100		volts
DC Plate Current	2.5		amp
DC Grid Current (Approx.)**	0.51		amp
Driving Power (Approx.)**	510		watts
Power Output (Approx.)	15.8		kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.)♦	3000		watts
Power Output (Approx.)	18		kw

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without amplitude modulation□

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	11500	max.	volts
DC GRID VOLTAGE	-2000	max.	volts
DC PLATE CURRENT	4	max.	ma
DC GRID CURRENT	0.65	max.	ma
PLATE INPUT	40	max.	kw
PLATE DISSIPATION	25	max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	10000	11000		volts
DC Grid Voltage:				
from a fixed supply of	-500	-540		volts
from a grid resistor of	860	900		ohms
from a cathode resistor of	125	130		ohms
Peak RF Grid Voltage	1000	1050		volts
DC Plate Current	3.5	3.6		amp
DC Grid Current (Approx.)**	0.58	0.61		amp
Driving Power (Approx.)**	515	575		watts
Power Output (Approx.)	25	29.5		kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.)	3400	3750		watts
Power Output (Approx.)	28	32.5		kw

● **CCS** = Continuous Commercial Service.

* Averaged over any audio-frequency cycle of sine-wave form.

**,○,♦,□: See next page.

9C27
POWER TRIODE

** Subject to wide variations depending on the impedance of the plate circuit. High-impedance plate circuits require more grid current and driving power to obtain the desired output. Low-impedance plate circuits need less grid current and driving power, but plate-circuit efficiency is sacrificed. The driving stage should have a tank circuit of good regulation and should be capable of supplying considerably more than the required driving power.

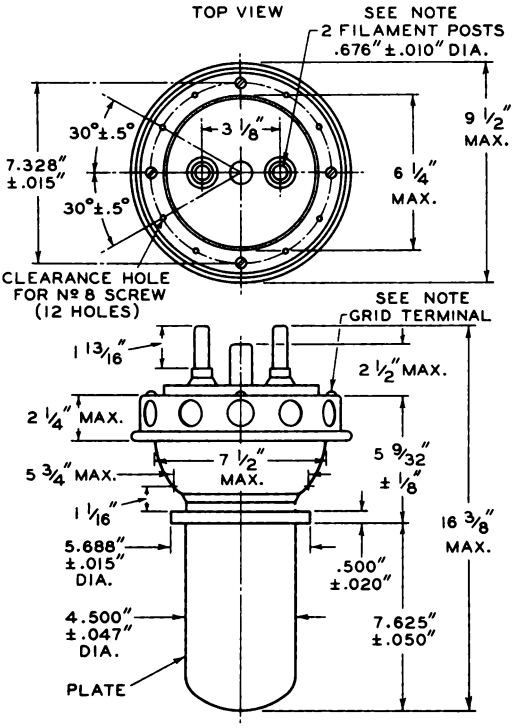
o At crest of audio-frequency cycle with modulation factor of 1.0.

♦ Carrier power of driver modulated 100%.

□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

Data on operating frequencies for the 9C27 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

9C27
POWER TRIODE

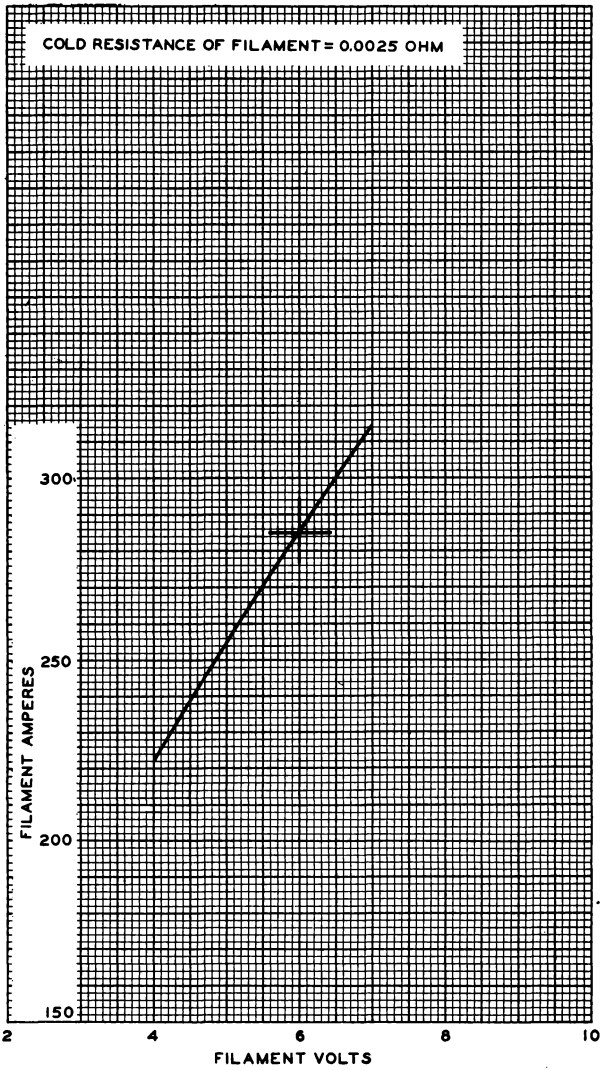


NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

92CM-6709

9C27

9C27
AVERAGE FILAMENT CHARACTERISTIC



APRIL 15,1946

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

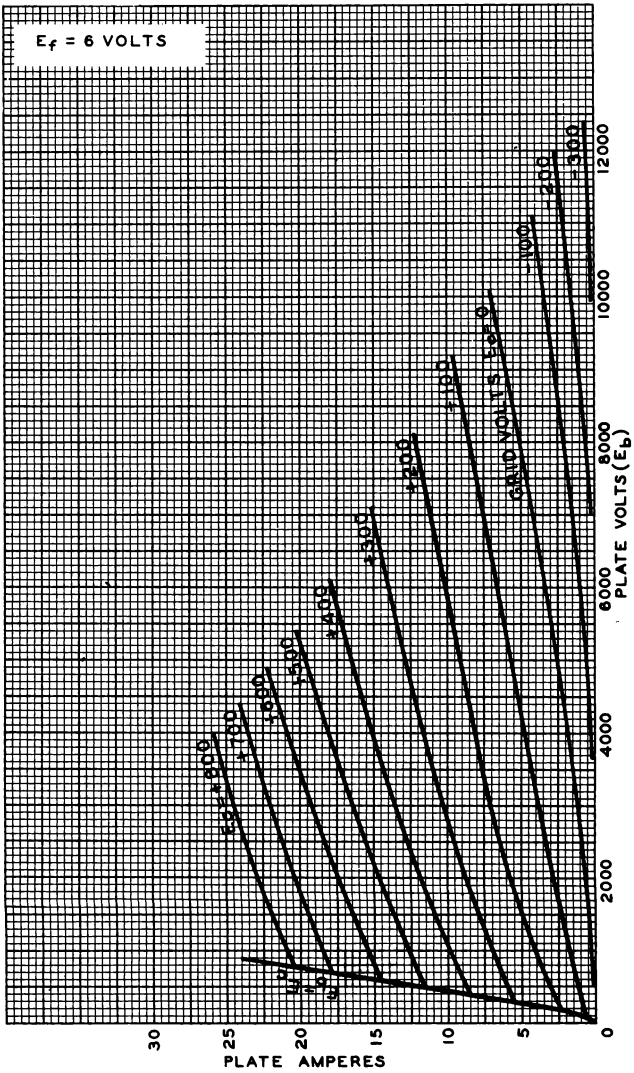
92CM-6756

DELETE

9C27

9C27

AVERAGE PLATE CHARACTERISTICS



APRIL 17, 1946

TUBE DEPARTMENT

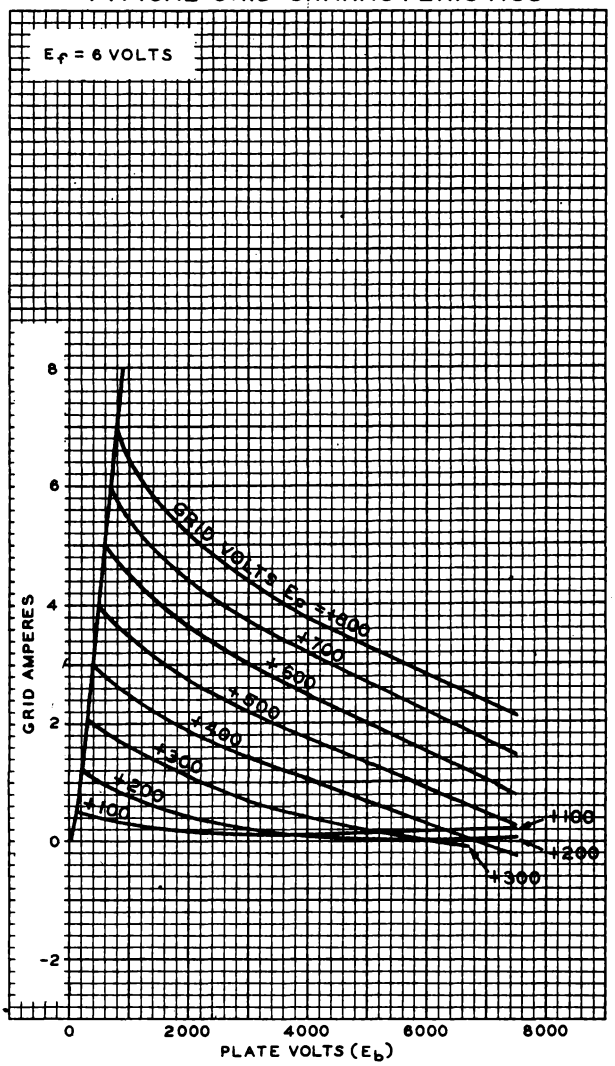
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6757

9C27

9C27

TYPICAL GRID CHARACTERISTICS



APRIL 23, 1946

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6759

10-Y
POWER AMPLIFIER TRIODE

GENERAL DATA

Electrical:

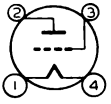
Filament, Thoriated Tungsten:		
Voltage	7.5	ac or dc volts
Current	1.25	amp
Amplification Factor	8	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	7	μμf
Grid to Filament	4	μμf
Plate to Filament	3	μμf

Mechanical:

Mounting Position	Vertical, base down
Maximum Overall Length	5-3/8"
Maximum Seated Length	4-3/4"
Maximum Diameter	2-1/16"
Bulb	ST-16
Base	Medium-Shell Small 4-Pin Micanol, Bayonet
Basing Designation for BOTTOM VIEW	4D

Pin 1 - Filament

Pin 2 - Plate



Pin 3 - Grid

Pin 4 - Filament

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	350 max.	volts
DC GRID VOLTAGE	-200 max.	volts
DC PLATE CURRENT	60 max.	ma.
DC GRID CURRENT	15 max.	ma.
PLATE INPUT	17.5 max.	watts
PLATE DISSIPATION	10 max.	watts

Typical Operation:

DC Plate Voltage	250	350	volts
DC Grid Voltage	-95	-135	volts
Peak RF Grid Voltage	195	235	volts
DC Plate Current	45	45	ma.
DC Grid Current (Approx.)□	15	15	ma.
Driving Power (Approx.)□	3	3.5	watts
Power Output (Approx.)	5.5	8	watts

□ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

10-Y

10-Y
POWER AMPLIFIER TRIODE

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	450 max.	volts
DC GRID VOLTAGE	-200 max.	volts
DC PLATE CURRENT	60 max.	ma.
DC GRID CURRENT	15 max.	ma.
PLATE INPUT	27 max.	watts
PLATE DISSIPATION	15 max.	watts

Typical Operation:

DC Plate Voltage	350	450	volts
DC Grid Voltage	-90	-115	volts
Peak RF Grid Voltage	190	215	volts
DC Plate Current	55	55	ma.
DC Grid Current (Approx.)□	15	15	ma.
Driving Power (Approx.)□	3	3.3	watts
Power Output (Approx.)	9	13	watts

□ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

Data on operating frequencies for the 10-Y are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

203-A
R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Amplification Factor	25	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	14.5	μμf
Grid to Filament	6.5	μμf
Plate to Filament	5.5	μμf
Maximum Overall Length		7-7/8"
Maximum Diameter		2-5/16"
Bulb		T-18
Base		Jumbo 4-Large Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage	1250 max.	volts
Max-Signal D-C Plate Current *	175 max.	ma.
Max-Signal Plate Input *	220 max.	watts
Plate Dissipation *	100 max.	watts

Typical Operation - 2 tubes:

Unless otherwise specified, values are for 2 tubes.

Filament Voltage	10	10	a-c volts
D-C Plate Voltage	1000	1250	volts
D-C Grid Voltage	-35	-45	volts
Peak A-F Grid-to-Grid Voltage	310	330	volts
Zero-Signal D-C Plate Current	26	26	ma.
Max-Signal D-C Plate Current	320	320	ma.
Load Resistance (per tube)	1725	2250	ohms
Effective Load Res. (plate to plate)	6900	9000	ohms ←
Max-Signal Driving Power	10	11	approx. watts
Max-Signal Power Output	200	260	approx. watts

* Averaged over any audio frequency cycle of sine-wave form. ←

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	1250 max.	volts
D-C Plate Current	150 max.	ma.
R-F Grid Current	6 max.	amp..
Plate Input	150 max.	watts
Plate Dissipation	100 max.	watts

Typical Operation:

Filament Voltage	10	10	a-c volts
D-C Plate Voltage	1000	1250	volts
D-C Grid Voltage	-35	-45	volts
Peak R-F Grid Voltage	95	90	volts
D-C Plate Current	130	106	ma.
D-C Grid Current **	5	3	approx. ma.
Driving Power ** °	5	3	approx. watts
Power Output	40	42.5	approx. watts

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS
° At crest of a-f cycle with Modulation Factor of 1.0.

← Indicates a change

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

203-A

R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		1000 max.	volts
→ D-C Grid Voltage		-400 max.	volts
D-C Plate Current		175 max.	ma.
D-C Grid Current		60 max.	ma.
R-F Grid Current		6 max.	amp.
Plate Input		175 max.	watts
Plate Dissipation		67 max.	watts
Typical Operation:			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	750	1000	volts
D-C Grid Voltage	-100	-135	volts
Peak R-F Grid Voltage	235	275	volts
D-C Plate Current	150	150	ma.
D-C Grid Current **	50	50	approx.ma.
Driving Power **	12	14	approx.watts
Power Output	65	100	approx.watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage			1250 max.	volts
→ D-C Grid Voltage			-400 max.	volts
D-C Plate Current			175 max.	ma.
D-C Grid Current			60 max.	ma.
R-F Grid Current			7.5 max.	amp.
Plate Input			220 max.	watts
Plate Dissipation			100 max.	watts
Typical Operation:				
Filament Voltage	10	10	10	a-c volts
D-C Plate Voltage	750	1000	1250	volts
D-C Grid Voltage	-75	-100	-125	volts
Peak R-F Grid Voltage	195	225	255	volts
D-C Plate Current	150	150	150	ma.
D-C Grid Current **	25	25	25	approx.ma.
Driving Power **	5	6	7	approx.watts
Power Output	65	100	130	approx.watts

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

For use of the 203-A at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

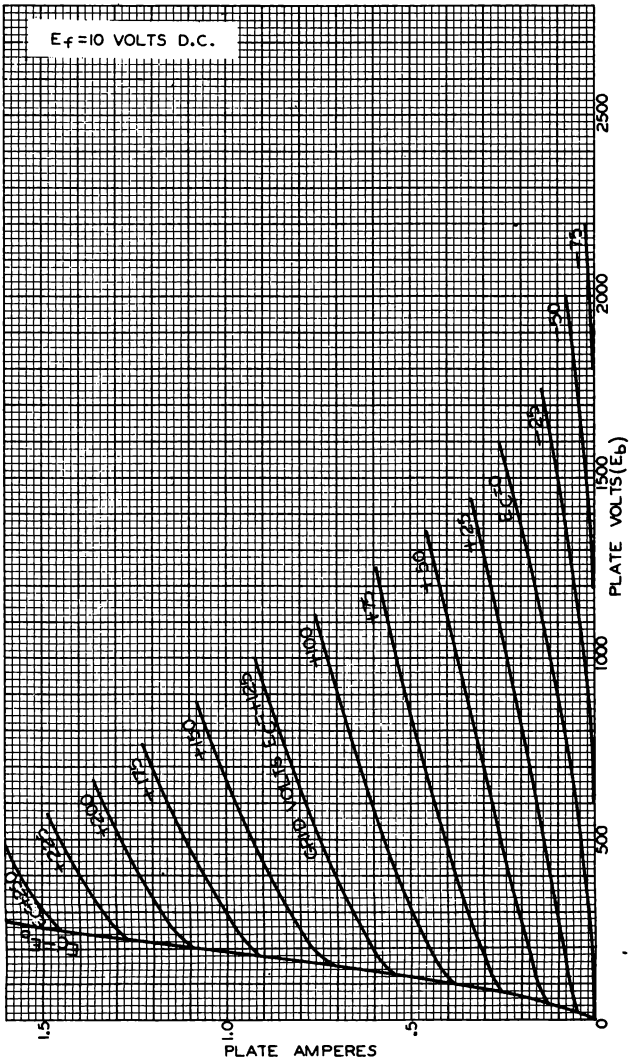
OUTLINE DIMENSIONS, TUBE SYMBOL, and SOCKET CONNECTIONS for the 203-A are the same as for the 211

← Indicates a change

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

203-A

AVERAGE PLATE CHARACTERISTICS

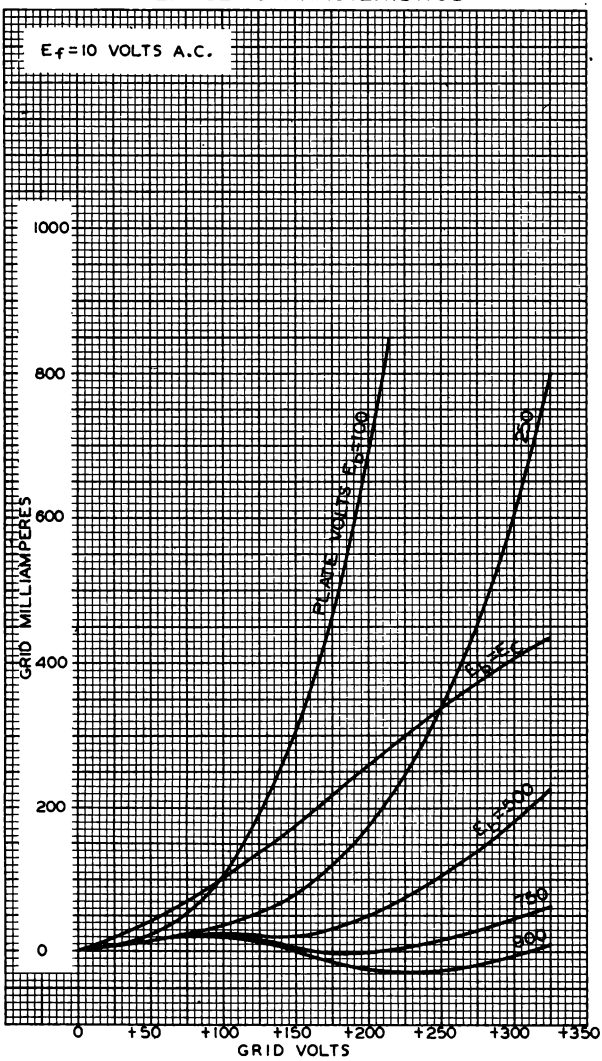


FEB. 27, 1934

925-5463

203-A

AVERAGE CHARACTERISTICS



204-A

R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	11	a-c or d-c volts
Current	3.85	amp.
Amplification Factor	23	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	15	μμf
Grid to Filament	12.5	μμf
Plate to Filament	2.3	μμf
Overall Length		14-1/4" ± 1/8"
Maximum Diameter		4-1/16"
Bulb		T-32
Cap		No.1904
Base		No.3502

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage	3000 max.	volts
Max.-Signal D-C Plate Current*	275 max.	ma.
Max.-Signal Plate Input*	600 max.	watts
Plate Dissipation*	250 max.	watts

Typical Operation - 2 tubes:

Unless otherwise specified, values are for 2 tubes.

Filament Voltage	11	11	11	a-c volts
D-C Plate Voltage	2000	2500	3000	volts
D-C Grid Voltage	-60	-80	-100	volts
Peak A-F Grid-to-Grid Volt.	500	500	500	volts
Zero-Sig. D-C Plate Cur.	80	80	80	ma.
Max.-Sig. D-C Plate Cur.	500	420	372	ma.
Load Resistance (per tube)	2200	3400	5000	ohms
Effective Load Resistance (plate to plate)	8800	13600	20000	ohms
Max.-Signal Driving Power	20	18	18	approx.watts
Max.-Signal Power Output	600	650	700	approx.watts

* Averaged over any audio-frequency cycle.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	2500 max.	volts
D-C Plate Current	225 max.	ma.
R-F Grid Current	8 max.	amp.
Plate Input	400 max.	watts
Plate Dissipation	250 max.	watts

Typical Operation:

Filament Voltage	11	11	a-c volts
D-C Plate Voltage	1500	2000	volts
D-C Grid Voltage	-50	-70	volts
Peak R-F Grid Voltage	170	165	volts
D-C Plate Current	200	160	ma.
Driving Power** °	18	15	approx.watts
Power Output	80	100	approx.watts

**, °: See next page.

(continued on next page)

204-A

R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		2000	max.	volts
D-C Grid Voltage		-500	max.	volts
D-C Plate Current		275	max.	ma.
D-C Grid Current		80	max.	ma.
R-F Grid Current		8	max.	amp.
Plate Input		550	max.	watts
Plate Dissipation		167	max.	watts
Typical Operation:				
Filament Voltage	11	11	a-c	volts
D-C Plate Voltage	1500	2000		volts
D-C Grid Voltage	-200	-250		volts
Peak R-F Grid Voltage	450	500		volts
D-C Plate Current	250	250		ma.
D-C Grid Current **	35	35	approx.	ma.
Driving Power **	20	20	approx.	watts
Power Output	225	350	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage			2500	max.	volts
D-C Grid Voltage			-500	max.	volts
D-C Plate Current			275	max.	ma.
D-C Grid Current			80	max.	ma.
R-F Grid Current			10	max.	amp.
Plate Input			690	max.	watts
Plate Dissipation			250	max.	watts
Typical Operation:					
Filament Voltage	11	11	11	a-c	volts
D-C Plate Voltage	1500	2000	2500		volts
D-C Grid Voltage	-150	-175	-200		volts
Peak R-F Grid Voltage	400	425	440		volts
D-C Plate Current	250	250	250		ma.
D-C Grid Current **	30	30	30	approx.	ma.
Driving Power **	15	15	15	approx.	watts
Power Output	240	350	450	approx.	watts

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

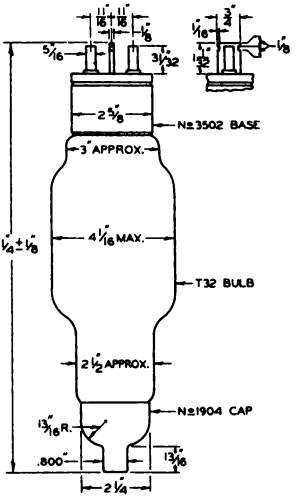
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

° At crest of audio-frequency cycle with modulation factor of 1.0.

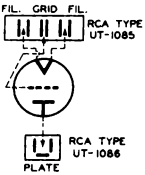
For use of the 204-A at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

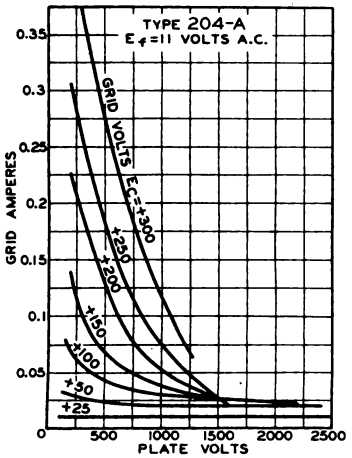
204-A
R-F POWER AMPLIFIER. OSCILLATOR CLASS B MODULATOR



TUBE SYMBOL & CONNECTIONS TO END-MOUNTINGS



TYPICAL CHARACTERISTICS

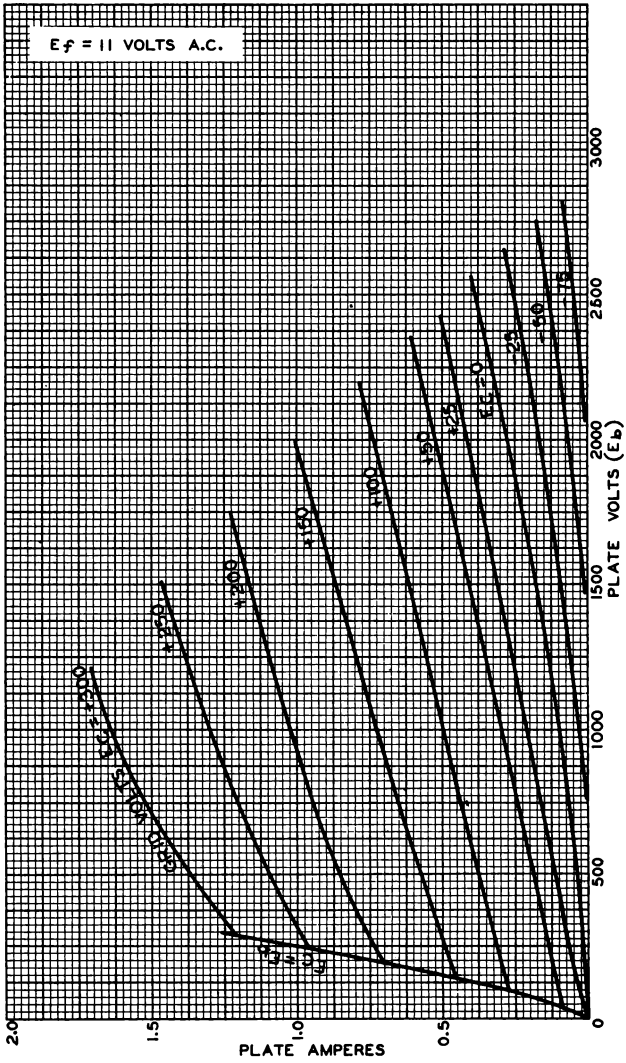


92C-4456R1

204-A

204-A

AVERAGE PLATE CHARACTERISTICS



JUNE 3, 1935

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4508

207
POWER TRIODE
WATER COOLED

GENERAL DATA

Electrical:

Filament, Tungsten:

Voltage	22	ac or dc volts
Current	52	amp
Starting Current: The filament current must never exceed 100 amperes, even momentarily.		
Cold Resistance	0.03	ohm

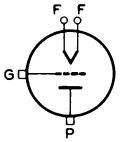
NOTE: This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in the General Section. ←

Amplification Factor	20	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	27	μμf
Grid to Filament	18	μμf
Plate to Filament	2	μμf

Mechanical: ←

Terminal Connections:

F – Filament
G – Grid Terminal



P – Water-Cooled Plate Terminal

Mounting Position	Vertical, Filament End Up	
Maximum Overall Length	20-1/4"	
Maximum Radius	6-1/2"	
Water Flow	3 to 8	gpm

The water flow must start before the application of any voltages and must continue for 2 minutes after the removal of all voltages.

Outlet Water Temperature	70 max.	°C
Water Pressure in Jacket	80 max.	psi

Components:

Water Jacket	RCA MI-7415
Gasket	RCA MI-7440

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	15000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	2 max.	amp
MAX.-SIGNAL PLATE INPUT*	20 max.	kw
PLATE DISSIPATION*	7.5 max.	kw

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	6000	10000	12500	volts
DC Grid Voltage†	-210	-410	-575	volts
Peak AF Grid-to-Grid Voltage	1520	2140	2300	volts
Zero-Signal DC Plate Current	0.5	0.5	0.4	amp
Max.-Signal DC Plate Current	2.5	3.2	2.8	amp

●,*,†: See next page. ← Indicates a change.

207
POWER TRIODE

Effective Load Resistance (Plate-to-plate) . . .	4200	6400	10000	ohms
Max.-Signal Driving Power (Approx.) . . .	190	380	400	watts
Max.-Signal Power Output (Approx.) . . .	8	20	22.5	kw

* Averaged over any audio-frequency cycle of sine-wave form.

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	15000 max.	volts
DC PLATE CURRENT	1 max.	amp
PLATE INPUT.	15 max.	kw
PLATE DISSIPATION.	10 max.	kw

Typical Operation:

DC Plate Voltage	6000	10000	14000	volts
DC Grid Voltage†	-225	-440	-650	volts
Peak RF Grid Voltage	400	600	730	volts
DC Plate Current	0.62	0.93	1	amp
Driving Power (Approx.)▲ . . .	72	16	0	watts
Power Output (Approx.)	1	2.5	4	kw

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	10000 max.	volts
DC GRID VOLTAGE.	-3000 max.	volts
DC PLATE CURRENT	1 max.	amp
DC GRID CURRENT.	0.2 max.	amp
PLATE INPUT.	10 max.	kw
PLATE DISSIPATION.	6.6 max.	kw

Typical Operation:

DC Plate Voltage	6000	8000	10000	volts
DC Grid Voltage●#	-1200	-1600	-2000	volts
Peak RF Grid Voltage	1860	2300	2660	volts
DC Plate Current	0.76	0.78	0.75	amp
DC Grid Current (Approx.). . .	0.15	0.14	0.07	amp
Driving Power (Approx.). . . .	280	325	185	watts
Power Output (Approx.)	3.5	5	6	kw

† For dc filament supply.
▲ At crest of audio-frequency cycle with modulation factor of 1.0.
● Obtained by grid resistor or by partial self-bias methods.

●,#: See next page.

207
POWER TRIODE

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	15000 max.	volts
DC GRID VOLTAGE	-3000 max.	volts
DC PLATE CURRENT	2 max.	amp
DC GRID CURRENT	0.2 max.	amp
PLATE INPUT	30 max.	kw
PLATE DISSIPATION	10 max.	kw

Typical Operation:

DC Plate Voltage	8000	10000	12000	volts
DC Grid Voltage▲▲#	-1000	-1200	-1600	volts
Peak RF Grid Voltage	1730	2050	2650	volts
DC Plate Current	1.10	1.33	1.67	amp
DC Grid Current (Approx.)	0.17	0.12	0.09	amp
Driving Power (Approx.)	295	245	235	watts
Power Output (Approx.)	6.5	10	15	kw

● Continuous Commercial Service.

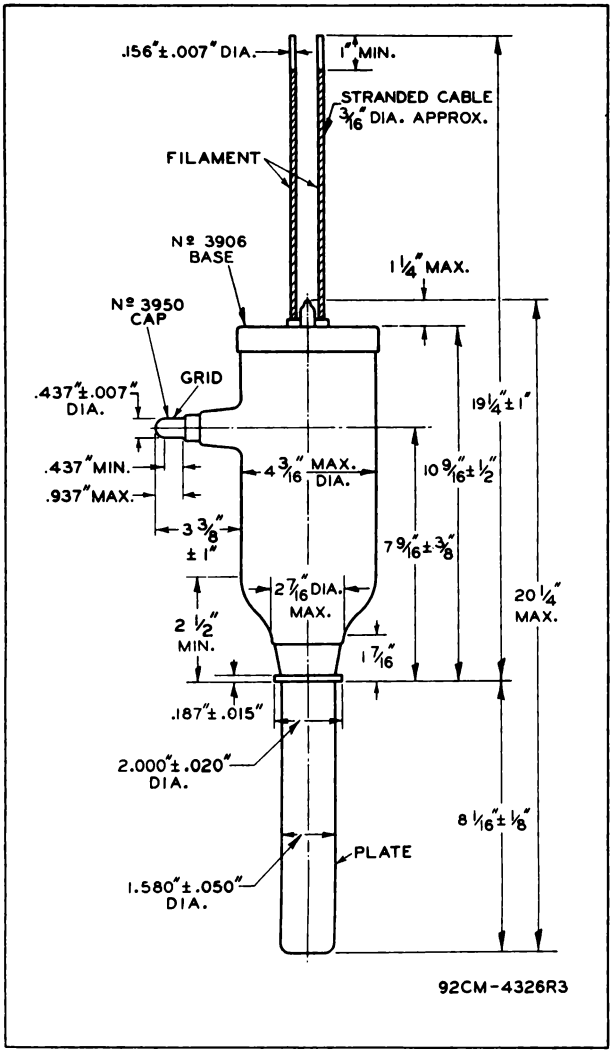
\# For ac filament supply.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

▲▲ Obtained from fixed supply, by grid resistor, or by cathode resistor.

Data on operating frequencies for the 207 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

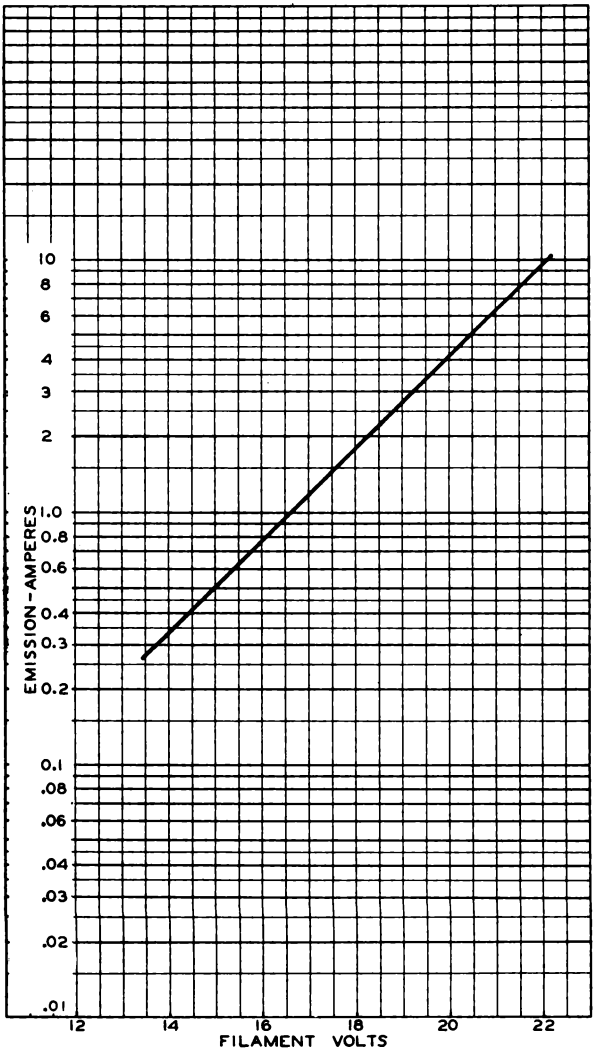
207
POWER TRIODE



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

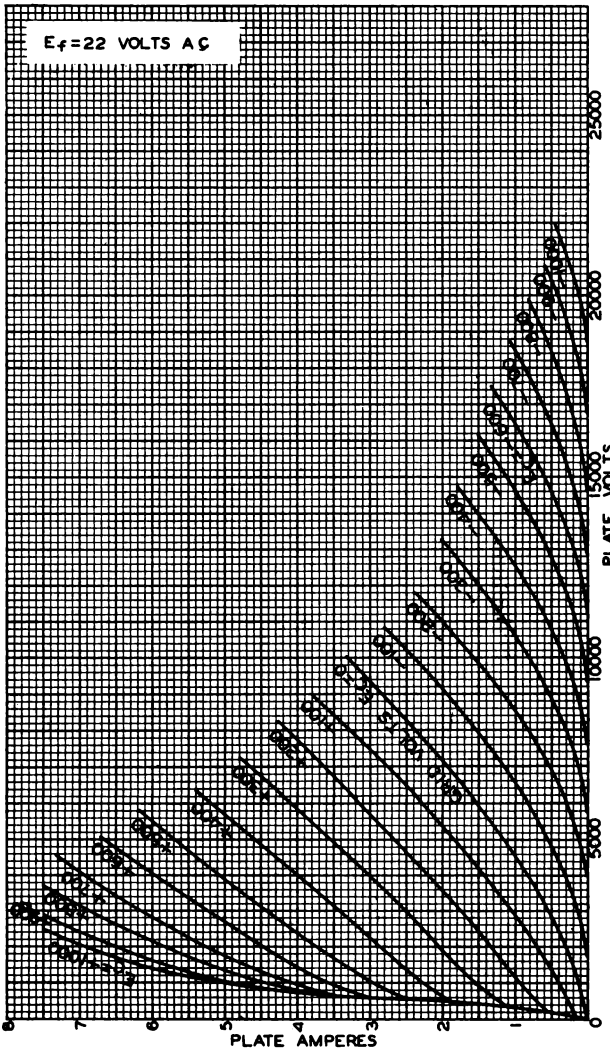
207

AVERAGE FILAMENT-EMISSION CHARACTERISTIC



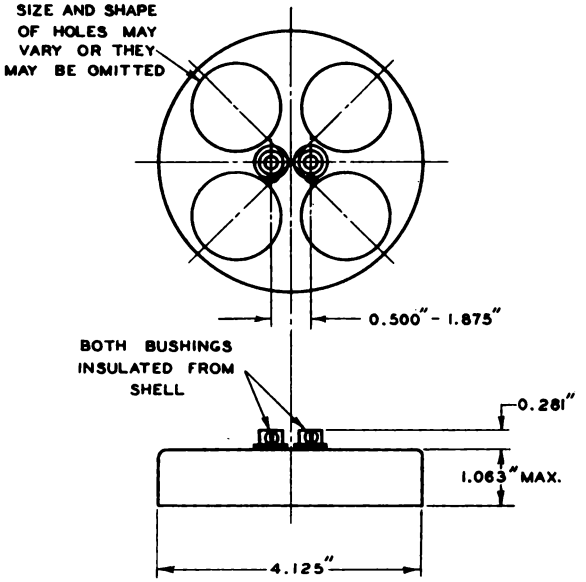
207

AVERAGE PLATE CHARACTERISTICS



207
POWER TRIODE

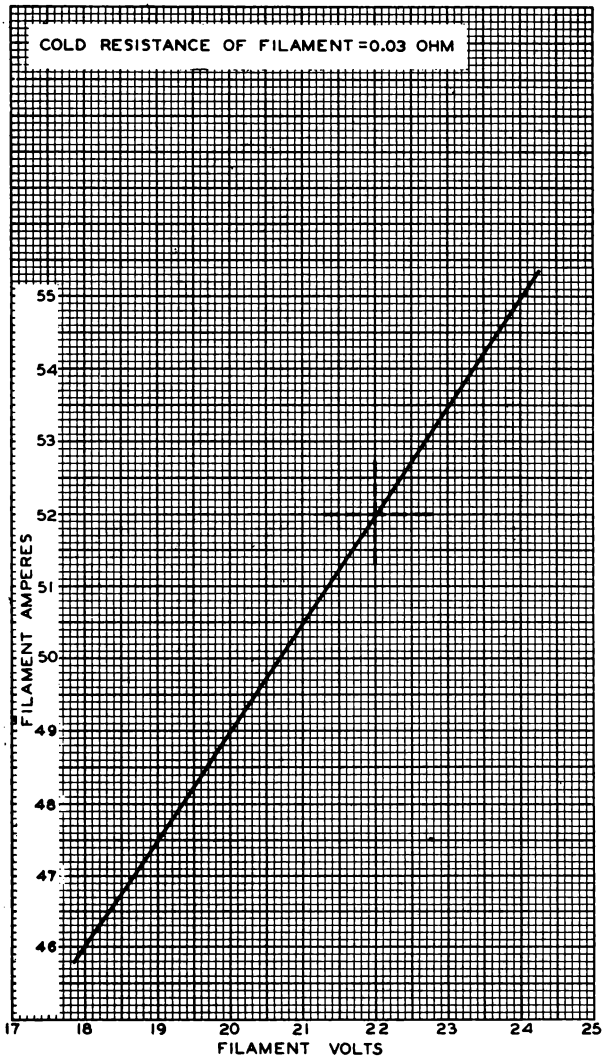
TERMINAL-SUPPORT SHELL
Nº 3906



92CS-7020

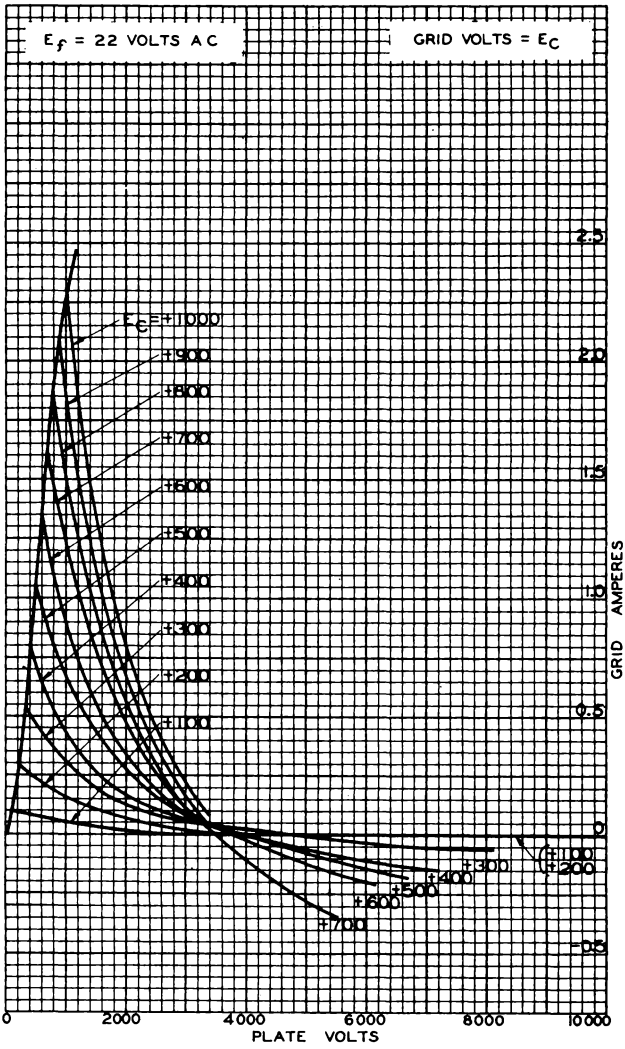
207

AVERAGE FILAMENT CHARACTERISTIC



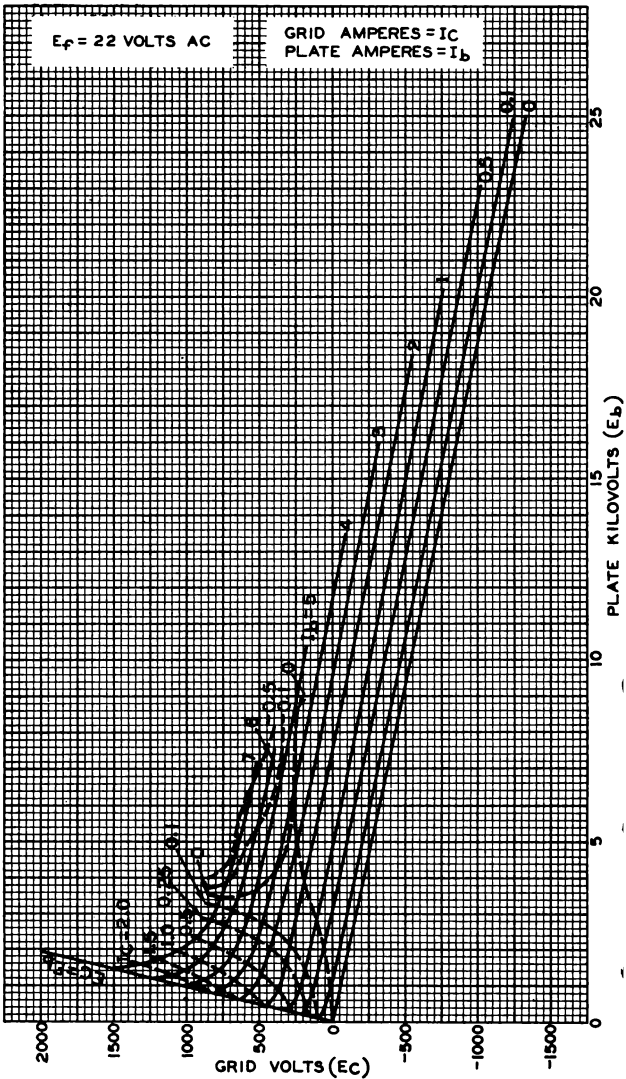
207

TYPICAL CHARACTERISTICS



207

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



SEPT. 2, 1948

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6084

211

POWER TRIODE

GENERAL DATA

Electrical:

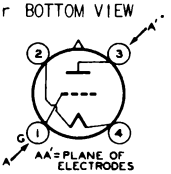
Filament, Thoriated-Tungsten:		
Voltage	10	ac or dc volts
Current	3.25	amp
Amplification Factor	12	
Direct Interelectrode Capacitances:		
Grid to Plate	14	μμf
Grid to Filament	5.4	μμf
Plate to Filament	4.8	μμf

Mechanical:

Mounting Position	Vertical, base down; or Horizontal, with pins 1 and 3 in vertical plane
Maximum Overall Length	7-7/8"
Maximum Diameter	2-5/16"
Bulb	T-18
Base	Medium-Metal-Shell Jumbo 4-Pin, Bayonet
Basing Designation for BOTTOM VIEW	4AZ

Pin 1 - Grid

Pin 2 - Filament



Pin 3 - Plate

Pin 4 - Filament

AF POWER AMPLIFIER & MODULATOR—Class A_1

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	1250 max.	volts
PLATE DISSIPATION	75 max.	watts

Typical Operation and Characteristics:

DC Plate Voltage	750	1000	1250	volts
DC Grid Voltage#	-46	-61	-80	volts
Peak AF Grid Voltage	41	56	75	volts
DC Plate Current	34	53	60	ma
Plate Resistance	4400	3800	3600	ohms
Transconductance	2750	3150	3300	μmhos
Load Resistance	8800	7600	9200	ohms
2nd Harmonic Distortion	5	5	5	%
Power Output	5.6	12	19.7	watts

AF POWER AMPLIFIER & MODULATOR—Class B

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	1250 max.	volts

●,#: See next page. ← Indicates a change.

RCA

211

POWER TRIODE

MAX.-SIGNAL DC PLATE CURRENT*	175 max.	ma
MAX.-SIGNAL PLATE INPUT*	220 max.	watts
PLATE DISSIPATION*	100 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1000	1250	volts
DC Grid Voltage#	-77	-100	volts
Peak AF Grid-to-Grid Voltage	380	410	volts
Zero-Signal DC Plate Current	20	20	ma
Max.-Signal DC Plate Current	320	320	ma
Effective Load Resistance (plate-to-plate)	6900	9000	ohms
Max.-Signal Driving Power (Approx.)	7.5	8	watts
Max.-Signal Power Output (Approx.)	200	260	watts

RF POWER AMPLIFIER—Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	1250 max.	volts
DC PLATE CURRENT	150 max.	ma
PLATE INPUT	150 max.	watts
PLATE DISSIPATION	100 max.	watts

Typical Operation:

DC Plate Voltage	1000	1250	volts
DC Grid Voltage#	-77	-100	volts
Peak RF Grid Voltage	125	125	volts
DC Plate Current	130	106	ma
DC Grid Current (Approx.)□	5	1	ma
Driving Power (Approx.)▲□	10	7.5	watts
Power Output (Approx.)	40	42.5	watts

PLATE-MODULATED RF POWER AMPLIFIER—Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	1000 max.	volts
DC GRID VOLTAGE	-400 max.	volts
DC PLATE CURRENT	175 max.	ma
DC GRID CURRENT	50 max.	ma
PLATE INPUT	175 max.	watts

* Averaged over any audio-frequency cycle of sine-wave form.

\# For ac filament supply.

▲ At crest of audio-frequency cycle with modulation factor of 1.0.

●,□: See next page.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

211

POWER TRIODE

PLATE DISSIPATION		67 max.	watts

Typical Operation:

DC Plate Voltage	750	1000	volts
DC Grid Voltage	-200	-260	volts
Peak RF Grid Voltage	350	410	volts
DC Plate Current	150	150	ma
DC Grid Current (Approx.)□	35	35	ma
Driving Power (Approx.)□	12	14	watts
Power Output (Approx.)	65	100	watts

RF POWER AMPLIFIER & OSCILLATOR—Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	1250 max.	volts
DC GRID VOLTAGE	-400 max.	volts
DC PLATE CURRENT	175 max.	ma
DC GRID CURRENT	50 max.	ma
PLATE INPUT	220 max.	watts
PLATE DISSIPATION	100 max.	watts

Typical Operation:

DC Plate Voltage	750	1000	1250	volts
DC Grid Voltage	-135	-175	-225	volts
Peak RF Grid Voltage	275	315	375	volts
DC Plate Current	150	150	150	ma
DC Grid Current (Approx.)□	18	18	18	ma
Driving Power (Approx.)□	5	6	7	watts
Power Output (Approx.)	65	100	130	watts

● Continuous Commercial service.

□ For effect of load resistance on grid current and driving power, refer to TUBE RATINGS--*Grid Current and Driving Power* in General Section.

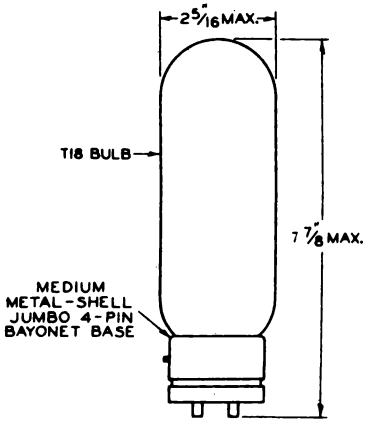
□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

Data on operating frequencies for the 211 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

211

211

POWER TRIODE



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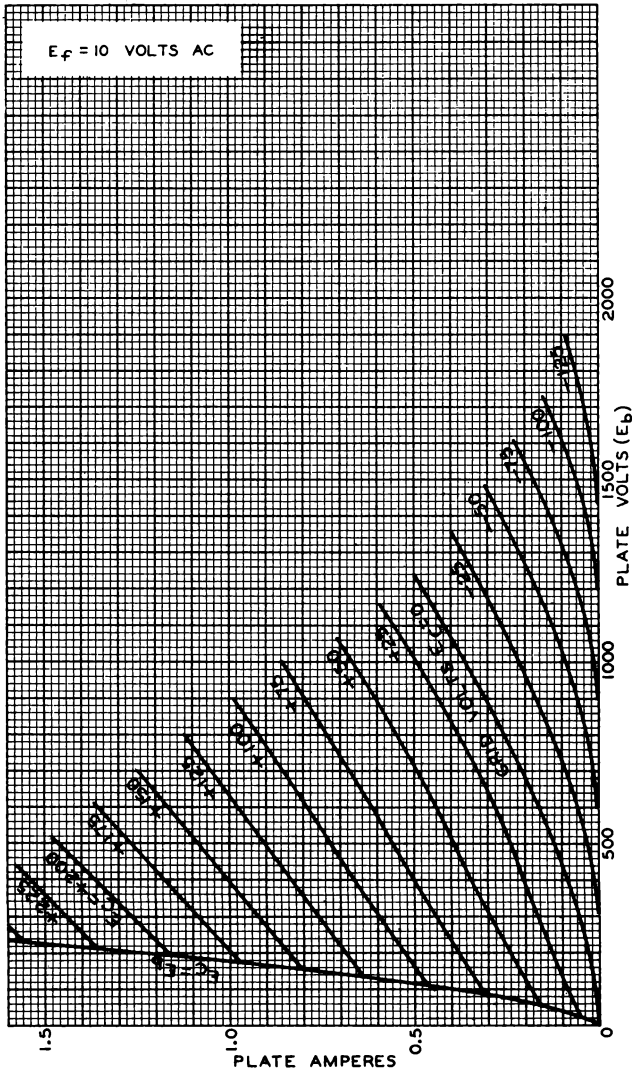
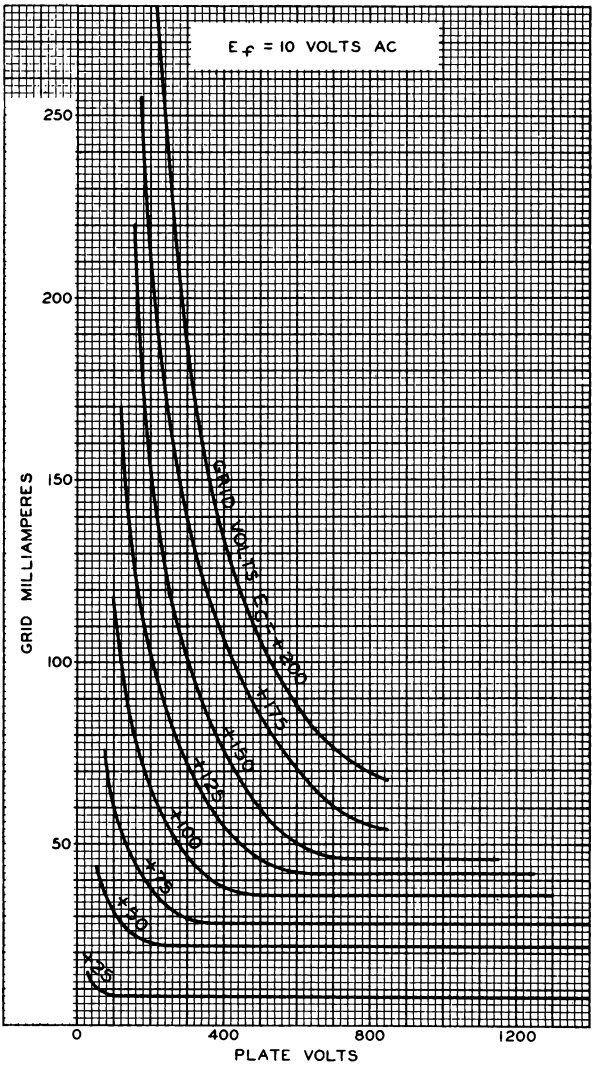
211

AVERAGE PLATE CHARACTERISTICS



211

TYPICAL CHARACTERISTICS



217-C

HALF-WAVE VACUUM RECTIFIER

NOT RECOMMENDED FOR NEW EQUIPMENT DESIGN

GENERAL DATA

Electrical:

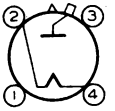
Filament, Thoriated Tungsten:

Voltage	10.0	ac volts
Current	3.25	amp

Mechanical:

Mounting Position	Vertical only, base down
Overall Length	8-1/4" ± 1/4"
Seated Length	7-15/16" ± 1/4"
Maximum Diameter	2-5/16"
Bulb	T-18
Cap	Medium
Base	Medium-Metal-Shell Jumbo 4-Pin, Bayonet
Basing Designation for BOTTOM VIEW	2C

Pin 1 - No Connection
Pin 2 - Filament
Pin 3 - No Connection



Pin 4 - Filament

Cap - Plate

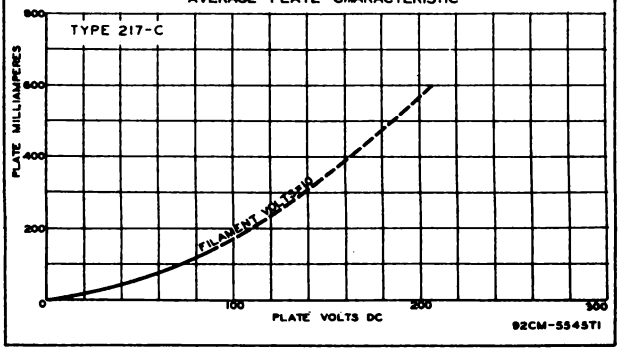
HALF-WAVE RECTIFIER

Maximum Ratings, ***Absolute Values:***

PEAK INVERSE PLATE VOLTAGE	7500 max.	volts
PEAK PLATE CURRENT	0.6 max.	amp
AVERAGE PLATE CURRENT	0.15 max.	amp

OUTLINE DIMENSIONS for the 217-C are the same as those for Type 805.

AVERAGE PLATE CHARACTERISTIC



575-A

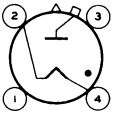
HALF-WAVE MERCURY-VAPOR RECTIFIER

The 575-A is the same as the 673 except for the following items.

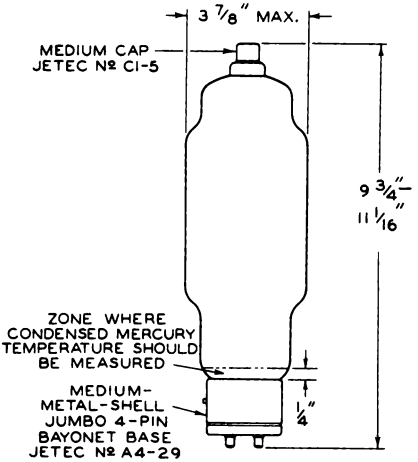
Mechanical:

Overall Length . . . . . 9-3/4" to 11-1/16"
Maximum Diameter . . . . . 3-7/8" ←
Base . . . . . Medium-Metal-Shell Jumbo 4-Pin ←
with Bayonet (JETEC No.A4-29)
Basing Designation for BOTTOM VIEW . . . . . 4AT ←

Pin 1 - No Connection
Pin 2 - Filament, Cathode Shield



Pin 3 - No Connection
Pin 4 - Filament
Cap - Anode



92CS-6654R1

← Indicates a change.

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HALF-WAVE MERCURY-VAPOR RECTIFIER

GENERAL DATA

Electrical:

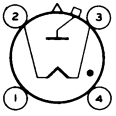
Filament, Coated:

Voltage	5 ± 5%	ac volts
Current at 5 volts	10	amp
Minimum heating time at rated voltage	30	sec
Peak Tube Voltage Drop (Approx.)	10	volts

Mechanical:

Mounting Position	Vertical, base down
Maximum Overall Length	11-3/8"
Seated Length	9-5/16" to 10-5/8"
Maximum Diameter	3-13/16"
Weight (Approx.)	13 oz
Cap	Medium (JETEC No.C1-5)
Base	Large-Metal-Shell Super-Jumbo 4-Pin with Bayonet (JETEC No.A4-18)
Basing Designation for BOTTOM VIEW	2P

Pin 1 - No Connection
Pin 2 - Filament, Cathode Shield



Pin 3 - Filament
Pin 4 - No Connection
Cap - Anode

Temperature Control:

Heating--When the ambient temperature is so low that the normal rise of condensed-mercury temperature above the ambient temperature will not bring the condensed-mercury temperature up to the minimum value of the operating ranges specified under *Maximum Ratings*, some form of heat-conserving enclosure or auxiliary heater will be required.

Cooling--When the operating conditions are such that the maximum value of the operating condensed-mercury temperature range is exceeded, provision should be made for forced-air cooling sufficient to prevent exceeding the maximum value.

Temperature Rise of Condensed-Mercury to Equilibrium Above Ambient Temperature (Approx.):

No load*	12	°C
Full load▲	17.5	°C

* With 4.75 volts rms on filament, and no heat-conserving enclosure.

▲ With 5.25 volts rms on filament, quadrature operation, average cathode current = 2.5 amperes, and no heat-conserving enclosure.

◄ indicates a change.

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HALF-WAVE MERCURY-VAPOR RECTIFIER

HALF-WAVE RECTIFIER — In-Phase Operation•

Maximum Ratings, *Absolute Values: For supply frequency of 60 cps*

	Operating Condensed-Mercury Temperature Range 20° to 60°C	20° to 50°C	
PEAK INVERSE ANODE VOLTAGE.	10000 max.	15000 max.	volts
ANODE CURRENT:			
Peak	7 max.	6 max.	amp
Average**.	1.75 max.	1.50 max.	amp
Fault, for duration of 0.1 second max.	100 max.	100 max.	amp

HALF-WAVE RECTIFIER — Quadrature Operation••

Maximum Ratings, *Absolute Values: For supply frequency of 60 cps*

	Operating Condensed-Mercury Temperature Range 20° to 60°C	20° to 50°C	
PEAK INVERSE ANODE VOLTAGE.	10000 max.	15000 max.	volts
ANODE CURRENT:			
Peak	10 max.	10 max.	amp
Average**.	2.5 max.	2.5 max.	amp
Fault, for duration of 0.1 second max.	100 max.	100 max.	amp

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	–	11.5	amp
Critical Anode Voltage .	2	–	100	volts
Peak Tube Voltage Drop .	3	–	16	volts

Note 1: With 5 volts rms on filament.

Note 2: With 4.75 volts rms on filament, and condensed-mercury temperature at 20°C.

Note 3: With 5 volts rms on filament, condensed-mercury temperature of 35° ± 5°C, peak anode current of 20 amperes provided by half-cycle pulse from a 60-cps sine wave and recurring approximately once a second. Tube drop is measured by an oscilloscope connected between anode and center tap of filament transformer.

• Filament voltage in phase with anode voltage.

** Averaged over any interval of 20 seconds maximum.

•• Filament voltage out of phase (60° to 120°) with anode voltage.

→ Indicates a change.

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HALF-WAVE MERCURY-VAPOR RECTIFIER

For Circuit Figures, see Front of this Section

CIRCUIT	MAX. TRANS. SEC. VOLTS (RMS) E	APPROX. DC OUTPUT VOLTS TO FILTER E_{av}	MAX. DC OUTPUT AMPERES I_{av}		MAX. DC OUTPUT KW TO FILTER Pdc	
Fig. 1 **Half-Wave** **Single-Phase** In-Phase Operation	10600□	4800	1.50		7.1	
	7000▲	3200	1.75		5.5	
Fig. 2 **Full-Wave** **Single-Phase** In-Phase Operation	5300□	4800	3.00		14.2	
	3500▲	3200	3.50		11.0	
Fig. 3 **Series** **Single-Phase** In-Phase Operation	10600□	9600	3.00		28.4	
	7000▲	6400	3.50		22.0	
Fig. 4 **Half-Wave** **Three-Phase** In-Phase Operation	6100□	7200	4.50		32.2	
	4000▲	4800	5.25		25.0	
Fig. 5 **Parallel** **Three-Phase** Quadrature Operation	6100□	7200	15.0		108	
	4000▲	4800	15.0		72	
Fig. 6 **Series** **Three-Phase** Quadrature Operation	6100□	14300	7.5		108	
	4000▲	9600	7.5		72	
Fig. 7 **Half-Wave** **Four-Phase** Quadrature Operation			*Resistive Load*	*Inductive Load*	*Resistive Load*	*Inductive Load*
	5300□	6750	9.0	10.0	60.8	67.5
	3500▲	4500	9.0	10.0	40.5	45.0
Fig. 8 **Half-Wave** **Six-Phase** Quadrature Operation			*Resistive Load*	*Inductive Load*	*Resistive Load*	*Inductive Load*
	5300□	7200	9.5	10.0	68.4	72.0
	3500▲	4800	9.5	10.0	45.6	48.0

□ For maximum peak inverse anode voltage of 15000 volts and condensed-mercury temperature range of 20° to 50°C.

▲ For maximum peak inverse anode voltage of 10000 volts and condensed-mercury temperature range of 20° to 60°C.

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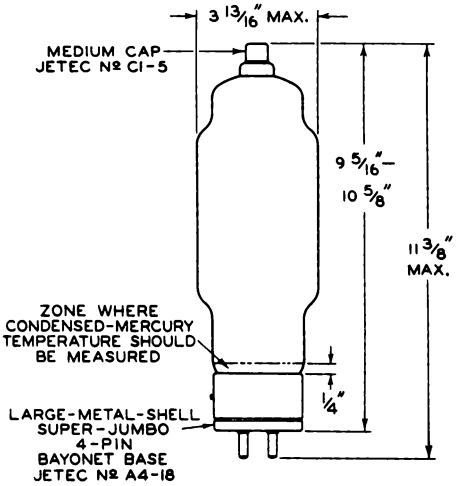
HALF-WAVE MERCURY-VAPOR RECTIFIER

OPERATING CONSIDERATIONS

Shields and rf filter circuits should be provided for the 673 if it is subjected to extraneous high-frequency fields during operation. These fields tend to produce breakdown effects in mercury vapor and are detrimental to tube life and performance. When shields are used, special attention must be given to providing adequate ventilation and to maintaining normal condensed-mercury temperature. Rf filters are employed to prevent damage caused by rf currents which might otherwise be fed back into the rectifier tubes.



92CS-6655R2

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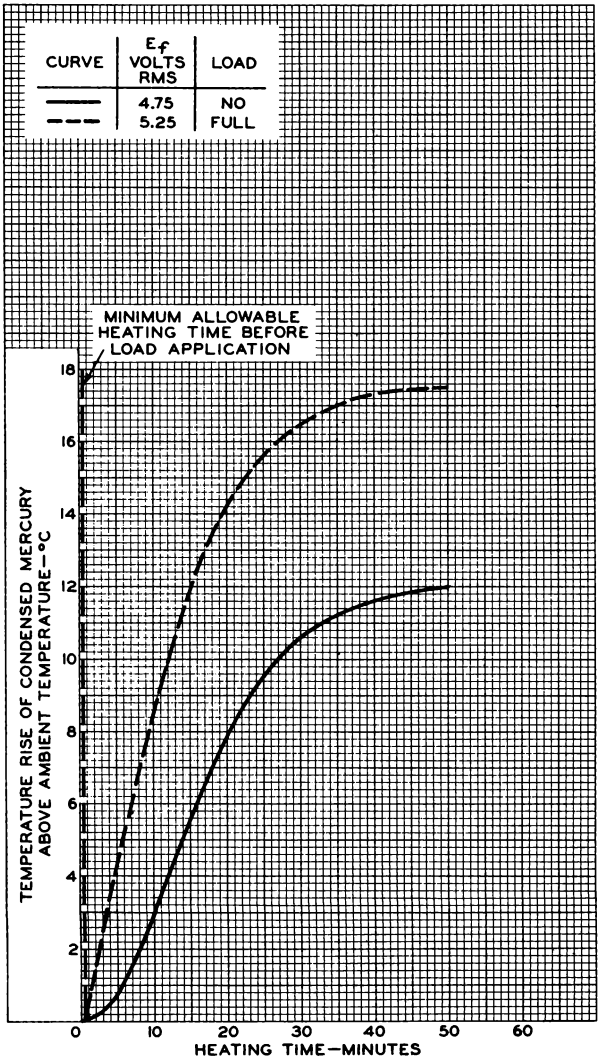
RATE OF RISE OF COND.-MERCURY TEMPERATURE



715-C
PULSE AMPLIFIER TETRODE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	26 ± 2.5	ac or dc volts
Current	2.1	amp
Minimum Heating Time	3	minutes
Direct Interelectrode Capacitances:°		
Grid No.1 to Plate	2 max.	μμf
Input	37.5	μμf
Output	7.5	μμf

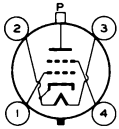
° With no external shield.

Mechanical:

Mounting Position	Vertical, base up or down
Overall Length	5-3/4" ± 1/8"
Seated Length	5-5/16" ± 1/8"
Maximum Diameter	2-9/16"
Bulb	T-20
Cap	Medium with Dished Flange
Base	Medium-Ceramic-Wafer Jumboid 4-Pin

BOTTOM VIEW

Pin 1 - Grid No.1
Pin 2 - Heater, Cathode



Pin 3 - Heater
Pin 4 - Grid No.2
Cap - Plate

MODULATOR - Pulsed Rectangular-Wave

With Inductive Load

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE SUPPLY VOLTAGE*	15000 max.	volts
PEAK POSITIVE PLATE VOLTAGE	18000 max.	volts
DC GRID-No.2 (SCREEN) SUPPLY VOLTAGE*	1350 max.	volts
DC GRID-No.1 (CONTROL GRID) SUPPLY VOLTAGE	-1000 max.	volts
PEAK GRID-No.1 VOLTAGE:		
Negative Value	1200 max.	volts
Positive Value	300 max.	volts
PEAK PLATE CURRENT**, for duty factor□ not exceeding 0.001	15 max.	amp

● Continuous Commercial Service.

□ Duty Factor equals product of pulse duration in seconds and the pulse repetition frequency in cycles per second.

** For peak currents in excess of 5 amperes, the product of peak plate current in amperes and pulse duration in microseconds should not exceed 30, and the tube should not be operated longer than 5 microseconds in any 100-microsecond interval.

For peak currents less than 5 amperes, the duty factor is determined by the maximum plate-dissipation rating of 60 watts.

*: See next page.

715-C
PULSE AMPLIFIER TETRODE

PEAK GRID-No.2 CURRENT	5 max.	amp
PEAK GRID-No.1 CURRENT	2 max.	amp
PLATE INPUT	225 max.	watts
GRID-No.2 INPUT	8 max.	watts
GRID-No.1 INPUT	1 max.	watt
PLATE DISSIPATION	60 max.	watts

Typical Operation:

Duty Factor of 0.001

DC Plate Supply Voltage*	15000	volts
DC Grid-No.2 Supply Voltage*	1250	volts
DC Grid-No.1 Supply Voltage	-800	volts
Peak Positive Grid-No.1 Voltage	+225	volts
Plate Current:		
DC Value	0.015	amp
Peak Value	15	amp
DC Grid-No.2 Current	0.0015	amp
DC Grid-No.1 Current	0.010	amp
Load Resistance	800	ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

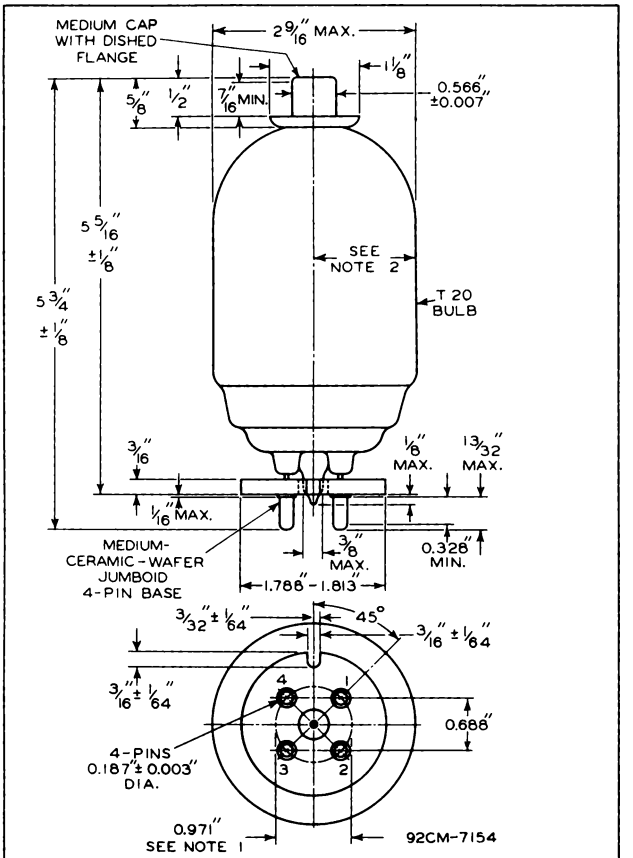
	Note	*Min.*	*Max.*	
Heater Current	1	1.9	2.3	amp
Grid-No.1-to-Plate Capacitance	-	-	2	μμf
Input	-	30	45	μμf
Output	-	5	10	μμf

Note 1: With 26 volts on heater.

* For tube protection, it is essential that the dc resistance in series with the plate supply and the grid-No.2 supply should be adequate to limit the short-circuit current to 0.5 ampere in either circuit.

715-C

PULSE AMPLIFIER TETRODE



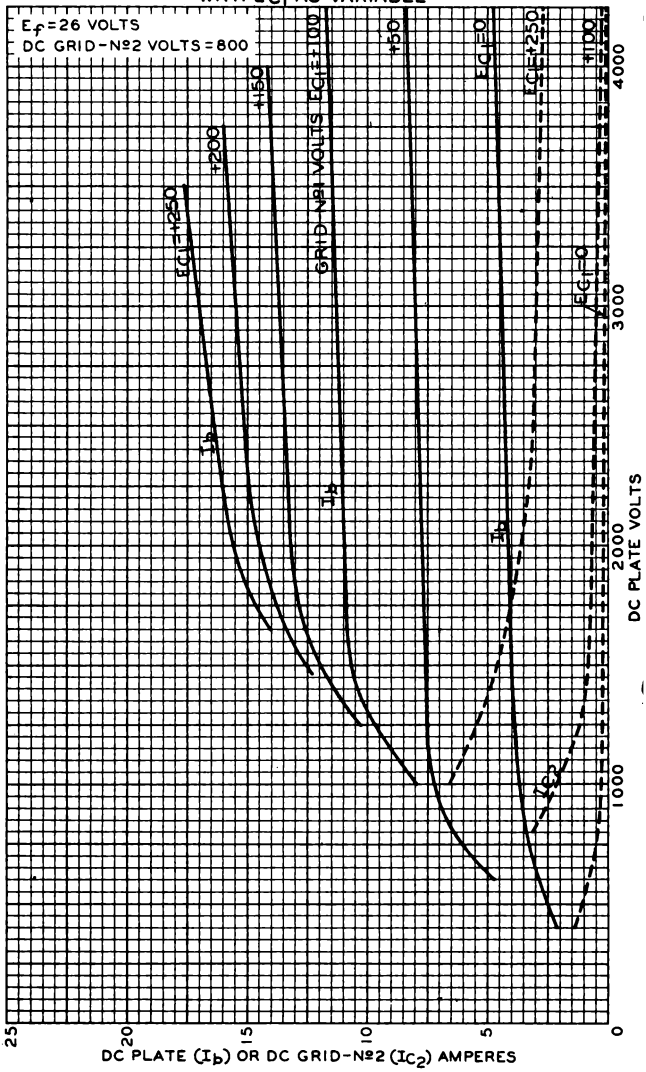
NOTE 1: PINS WILL FIT A FLAT-PLATE GAUGE HAVING THICKNESS OF 1/4" AND FOUR HOLES 0.2140" ± 0.0005" SO LOCATED ON A 0.9710" ± 0.0005" DIAMETER CIRCLE THAT THE DISTANCE ALONG THE CHORD BETWEEN ANY TWO ADJACENT HOLE CENTERS IS 0.6875" ± 0.0005". GAUGE IS ALSO PROVIDED WITH A 7/16" DIAMETER HOLE CONCENTRIC WITH PIN CIRCLE FOR THE EXHAUST TIP.

NOTE 2: WHEN TUBE IS ROTATED ABOUT AXIS OF ITS BASE, THE MAXIMUM RADIAL DISTANCE BETWEEN ANY POINT ON THE BULB AND THE ROTATIONAL AXIS DOES NOT EXCEED 1-13/32".

715-C

715-C

AVERAGE PLATE CHARACTERISTICS
WITH E_{C1} AS VARIABLE



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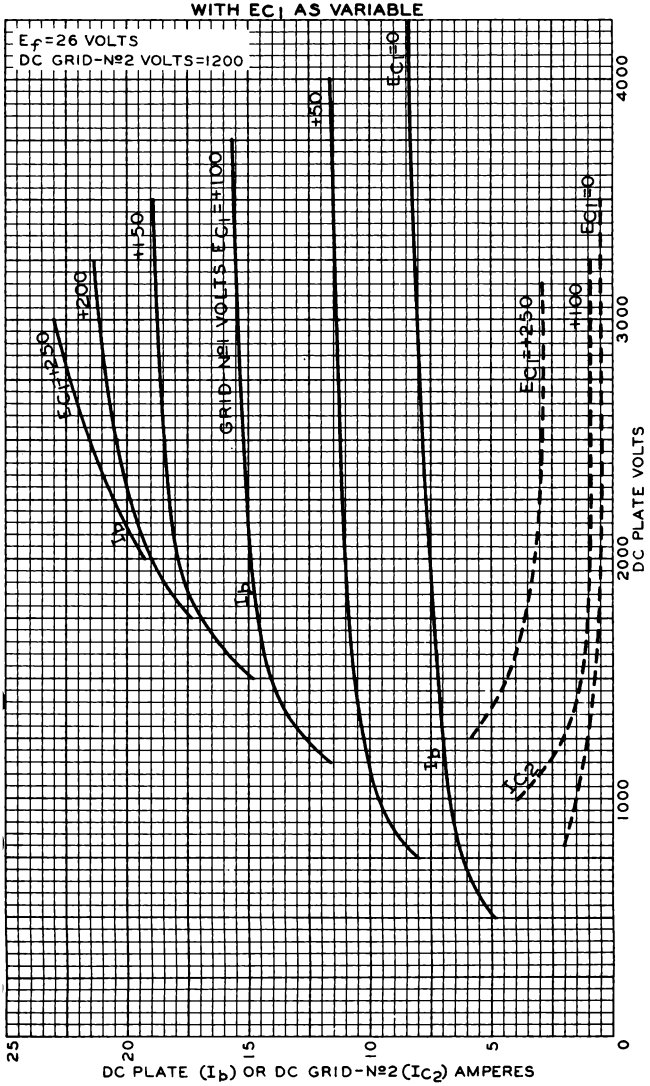
92CM-7186

715-C

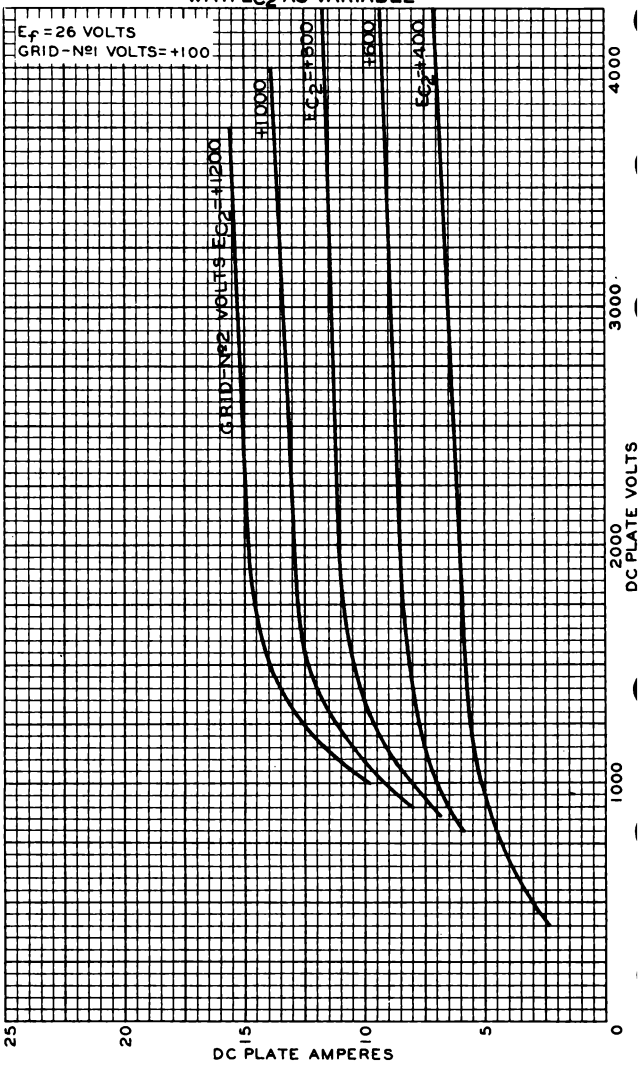
AVERAGE PLATE CHARACTERISTICS
WITH E_{C1} AS VARIABLE



715-C

715-C

AVERAGE PLATE CHARACTERISTICS
WITH E_{C2} AS VARIABLE



FEB.23,1949

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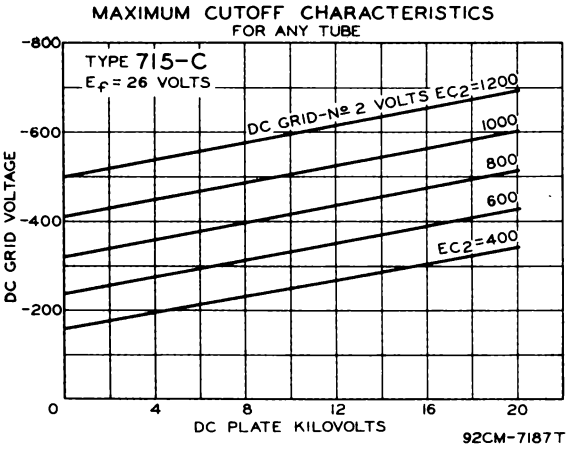
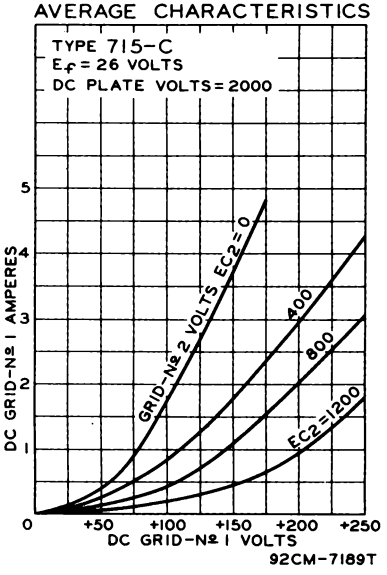
92CM-7190

715-C

PULSE AMPLIFIER TETRODE





800

TRANSMITTING TRIODE

Filament	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	3.1	amp. ←
Amplification Factor	15	
Direct Interelectrode Capacitances:		
Grid to Plate	2.5	μμf
Grid to Filament	2.8	μμf
Plate to Filament	2.8	μμf
Overall Length		6-5/32" ± 7/32" ←
Seated Height		5-17/32" ± 7/32" ←
Maximum Diameter		2-11/16"
Bulb		S-21
Caps (two)		Small
Base		Medium 4-Pin, Bayonet
RCA Socket		Stock No. 9937 ←

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage			1250 max.	volts
Max.-Signal D-C Plate Current*			115 max.	ma.
Max.-Signal Plate Input*			85 max.	watts
Plate Dissipation*			35 max.	watts
Typical Operation:				
Unless otherwise specified, values are for 2 tubes.				
D-C Plate Voltage	750	1000	1250	volts
D-C Grid Voltage**	-40	-55	-70	volts
Peak A-F Grid-to-Grid Volt.	320	300	300	volts
Zero-Signal D-C Plate Cur.	26	28	30	ma.
Max.-Signal D-C Plate Cur.	210	160	130	ma.
Load Resistance (per tube)	1600	3125	5250	ohms
Effective Load Resistance (plate to plate)	6400	12500	21000	ohms
Max.-Signal Driving Power	6.0	4.4	3.4	approx. watts
Max.-Signal Power Output	90	100	106	approx. watts

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			1250 max.	volts
D-C Plate Current			45 max.	ma.
Plate Input			50 max.	watts
Plate Dissipation			35 max.	watts
Typical Operation:				
D-C Plate Voltage		750	1000	volts
D-C Grid Voltage**		-40	-55	volts
Peak R-F Grid Voltage		160	170	volts
D-C Plate Current		45	42	ma.
D-C Grid Current †		2	2	approx. ma.
Driving Power °†		3.6	3.3	approx. watts
Power Output		10	14	approx. watts

*, **, †, °: See next page. ← Indicates a change.

800

TRANSMITTING TRIODE

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			1000 max.	volts
D-C Grid Voltage			-400 max.	volts
D-C Plate Current			80 max.	ma.
D-C Grid Current			25 max.	ma.
Plate Input			80 max.	watts
Plate Dissipation			23 max.	watts
→ Typical Operation:				
D-C Plate Voltage	750	1000		volts
D-C Grid Voltage ††	-150	-200		volts
	10000	13300		ohms
Peak R-F Grid Voltage	275	325		volts
D-C Plate Current	70	70		ma.
D-C Grid Current †	15	15	approx.	ma.
Driving Power †	3	4	approx.	watts
Power Output	35	50	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

*Key-down conditions per tube without modulation****

D-C Plate Voltage			1250 max.	volts
D-C Grid Voltage			-400 max.	volts
D-C Plate Current			80 max.	ma.
D-C Grid Current			25 max.	ma.
Plate Input			100 max.	watts
Plate Dissipation			35 max.	watts
→ Typical Operation:				
D-C Plate Voltage	750	1000	1250	volts
D-C Grid Voltage †††	-100	-135	-175	volts
	6700	9000	11700	ohms
	1200	1600	2100	ohms
Peak R-F Grid Voltage	225	260	300	volts
D-C Plate Current	70	70	70	ma.
D-C Grid Current †	15	15	15 approx.	ma.
Driving Power †	2	3	4 approx.	watts
Power Output	35	50	65 approx.	watts

* Averaged over any audio-frequency cycle of sine-wave form.

** For a-c filament supply.

*** Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

o At crest of a-f cycle with modulation factor of 1.0.

† Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

†† Obtained from grid resistor of value shown or by combination methods.

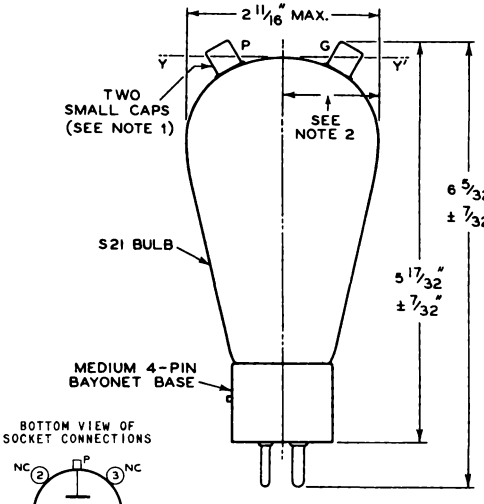
††† Obtained from a fixed supply, by grid resistor (6700, 9000, 11700) or by cathode resistor (1200, 1600, 2100).

Data on operating frequencies for the 800 are given on the sheet TRANS. TUBE RATINGS vs. FREQUENCY.

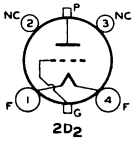
→ Indicates a change.

800

TRANSMITTING TRIODE

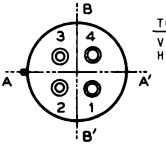


BOTTOM VIEW OF SOCKET CONNECTIONS



2D2

Pin 1 - Filament
Pin 2 - No Connection
Pin 3 - No Connection
Pin 4 - Filament
Cap P - Plate
Cap G - Grid



BOTTOM VIEW OF BASE

TUBE MOUNTING POSITION

VERTICAL: Base up or down.
HORIZONTAL: No.

92CM-4281R4

AS USED BELOW, PLANES AA', BB', AND YY' HAVE THE FOLLOWING DEFINITIONS:

1. PLANE AA' IS PLANE THROUGH AXIS OF BASE AND POINT MIDWAY BETWEEN PINS NO.1 AND NO.4.
2. PLANE BB' IS PLANE THROUGH AXIS OF BASE AND PERPENDICULAR TO PLANE AA'.
3. PLANE YY' IS TANGENT TO TOP OF BULB AND PERPENDICULAR TO AXIS OF BASE.

NOTE 1 -- WITH ALL MEASUREMENTS MADE PARALLEL TO THE PLANE YY' AND AT OR ABOVE THE PLANE, THE TOP CAPS ARE POSITIONED SO THAT:

a. NO PORTION OF CONTACT SURFACE EXTENDS MORE THAN 1-11/32" FROM THE PLANE BB'.

b. NO PORTION OF CONTACT SURFACE IS NEARER THAN 1/2" TO THE PLANE BB'.

c. NO PORTION OF CONTACT SURFACE EXTENDS MORE THAN 1/2" FROM THE PLANE AA'.

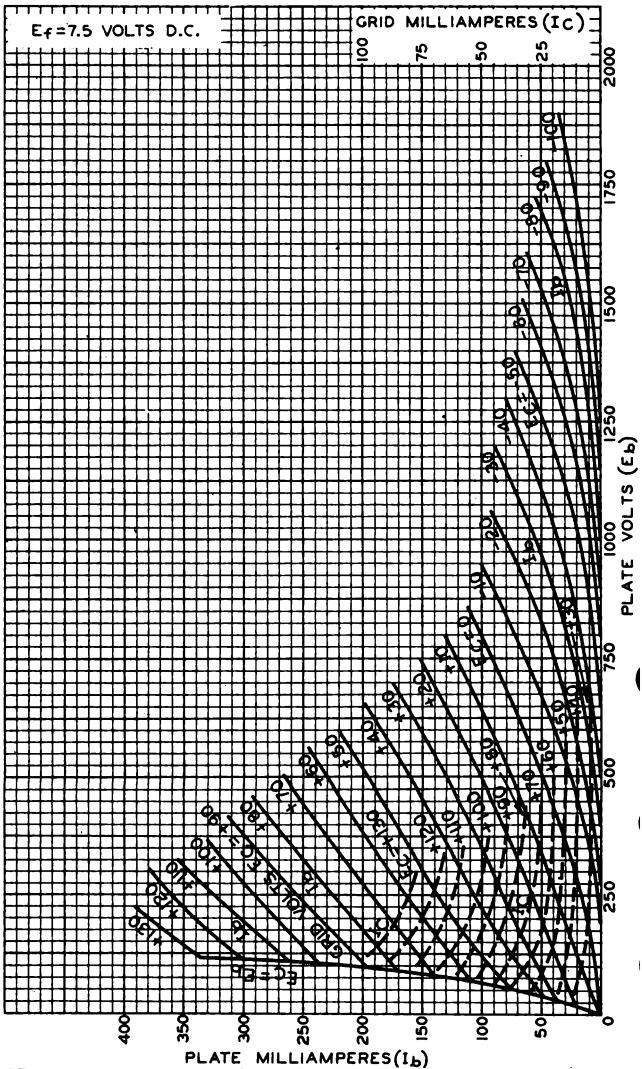
NOTE 2 -- WHEN TUBE IS ROTATED ABOUT AXIS OF ITS BASE, THE MAXIMUM RADIAL DISTANCE BETWEEN ANY POINT ON THE BULB AND THE ROTATIONAL AXIS DOES NOT EXCEED 1-7/16".

← indicates a change.

800

800

AVERAGE PLATE CHARACTERISTICS



SEPT. 11, 1933

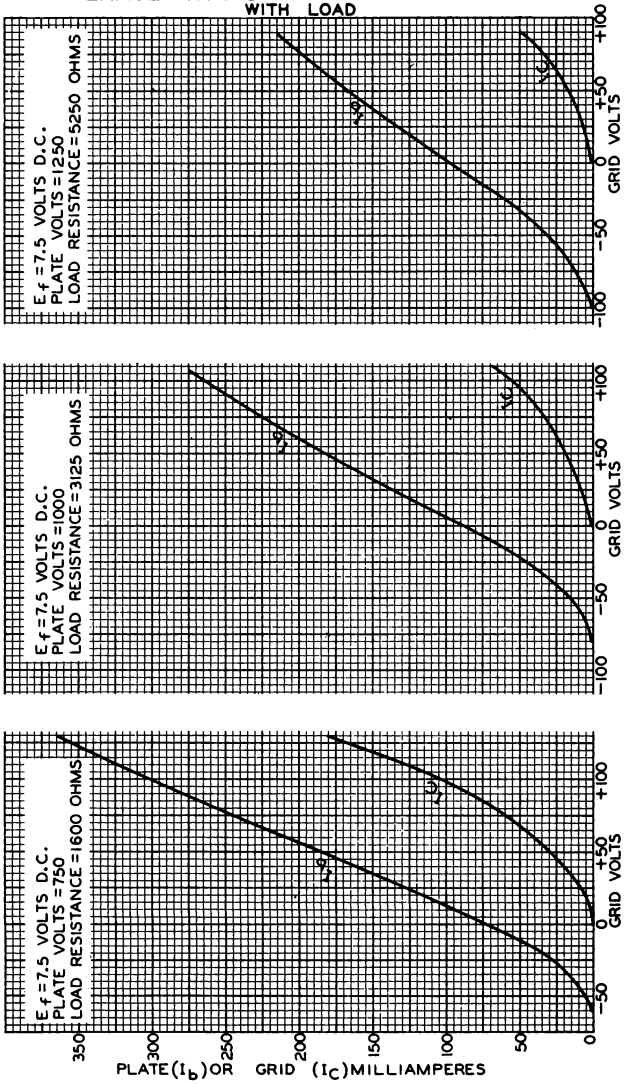
RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-5368

800

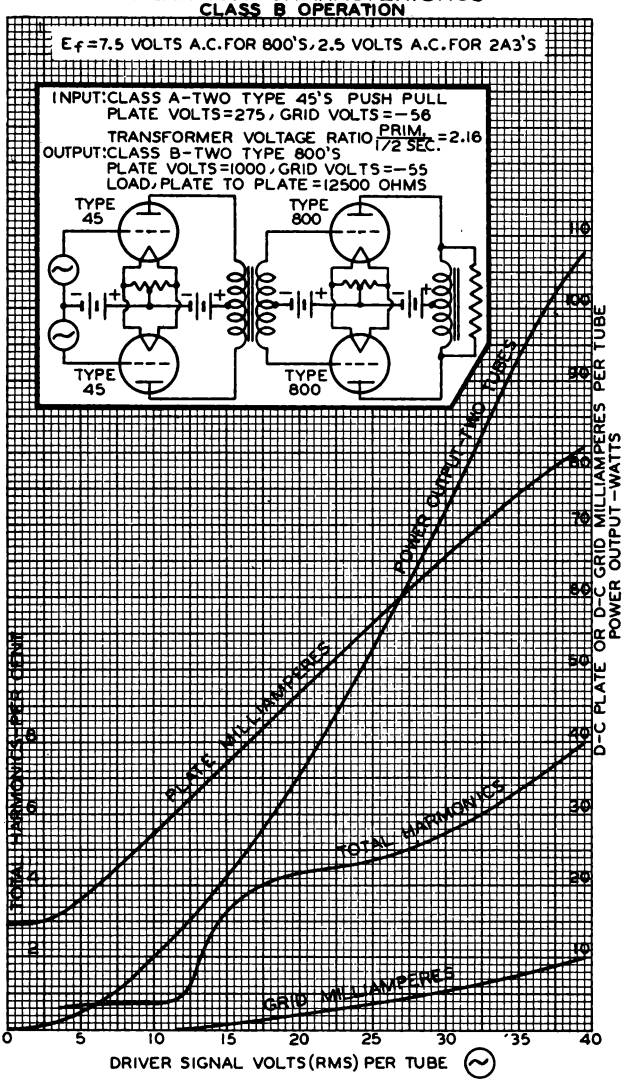
AVERAGE TRANSFER CHARACTERISTICS WITH LOAD



800

800

OPERATION CHARACTERISTICS
CLASS B OPERATION



JAN. 24, 1934

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

925-5447

801-A/801
R-F POWER AMPLIFIER, A-F POWER AMPLIFIER, MODULATOR

Filament	Thoriated tungsten	
Voltage	7.5	a-c or d-c volts
Current	1.25	amp.
Amplification Factor	8	
Direct Interelectrode Capacitances:		
Grid to Plate	6.0	μμf
Grid to Filament	4.5	μμf
Filament to Plate	1.5	μμf
Maximum Overall Length		5-3/8"
Maximum Diameter		2-1/16"
Bulb		ST-16
Base	Medium 4-Pin "MICANOL", Bayonet	←
RCA Socket		Type UR-542-A

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class A_1

D-C Plate Voltage			600 max.	volts
Plate Dissipation			20 max.	watts
Typical Operation:				
D-C Plate Voltage	425	500	600	volts
D-C Grid Voltage □△	-40	-45	-55	volts
Peak A-F Grid Voltage	35	40	50	volts
D-C Plate Current	18	24	30	ma.
Plate Resistance	5000	4600	4300	ohms
Transconductance	1600	1725	1840	μmhos
Load Resistance	10200	8000	7800	ohms
U.P.O. (5% second harmonic)	1.6	2.3	3.8	watts

□ The d-c resistance in the grid circuit should not exceed 0.5 megohm with cathode bias, or 0.1 megohm with fixed bias.

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage			600 max.	volts
Max.-Signal D-C Plate Current*			70 max.	ma.
Max.-Signal Plate Input*			42 max.	watts
Plate Dissipation*			20 max.	watts
Typical Operation:				
Unless otherwise specified, values are for 2 tubes				
D-C Plate Voltage	400	500	600	volts
D-C Grid Voltage △	-50	-60	-75	volts
Peak A-F Grid-to-Grid Voltage	270	290	320	volts
Zero-Signal D-C Plate Cur.	8	8	8	ma.
Max.-Signal D-C Plate Cur.	130	130	130	ma.
Load Resistance (per tube)	1500	2000	2500	ohms
Effective Load Resistance (plate to plate)	6000	8000	10000	ohms
Max.-Signal Driving Power	3	3	3	approx.watts
Max.-Signal Power Output	27	36	45	approx.watts

* Averaged over any audio-frequency cycle of sine-wave form.
△ With a-c filament supply.

← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

801-A
R-F POWER AMPLIFIER, A-F POWER AMPLIFIER, MODULATOR

(continued from preceding page)

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage		600 max.	volts
D-C Plate Current		50 max.	ma.
Plate Input		30 max.	watts
Plate Dissipation		20 max.	watts
Typical Operation:			
D-C Plate Voltage	500	600	volts
D-C Grid Voltage △	-60	-75	volts
Peak R-F Grid Voltage	85	90	volts
D-C Plate Current	45	45	ma.
D-C Grid Current**	0.2	0.2	approx.ma.
Driving Power** ○	2.2	2.3	approx.watts
Power Output	6	7.5	approx.watts

○ At crest of a-f cycle with modulation factor of 1.0

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		500 max.	volts
D-C Grid Voltage		-200 max.	volts
D-C Plate Current		60 max.	ma.
D-C Grid Current		15 max.	ma.
Plate Input		30 max.	watts
Plate Dissipation		13.5 max.	watts
Typical Operation:			
D-C Plate Voltage	400	500	volts
D-C Grid Voltage ▲△	-150	-190	volts
	10000	12700	ohms
Peak R-F Grid Voltage	260	300	volts
D-C Plate Current	55	55	ma.
D-C Grid Current**	15	15	approx.ma.
Driving Power**	4	4.5	approx.watts
Power Output	14	18	approx.watts

▲ Obtained by grid resistor of value shown, or by combination of grid resistor with either fixed supply or suitably by-passed cathode resistor.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage		600 max.	volts
D-C Grid Voltage		-200 max.	volts
D-C Plate Current		70 max.	ma.
D-C Grid Current		15 max.	ma.
Plate Input		42 max.	watts
Plate Dissipation		20 max.	watts
Typical Operation:			
D-C Plate Voltage	500	600	volts
→ D-C Grid Voltage ▽△	-125	-150	volts
	8300	10000	ohms
	1560	1875	ohms
Peak R-F Grid Voltage	235	260	volts

**, #, ▽, △: see next page. ← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

801-A
R-F POWER AMPLIFIER, A-F POWER AMPLIFIER, MODULATOR

(continued from preceding page)

D-C Plate Current	65	65	ma.
D-C Grid Current**	15	15	approx.ma.
Driving Power**	3.5	4	approx.watts
Power Output	20	25	approx.watts

▽ Obtained from fixed supply, by grid resistor (8300, 10000), or by cathode resistor (1560, 1875). When the 801-A is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With plate voltage of 600 volts, a fixed bias of at least 50 volts should be used.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

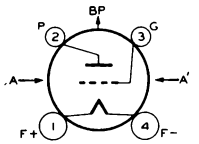
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

△ With a-c filament supply.

For use of the 801 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

For OUTLINE DIMENSIONS, refer to sheet OUTLINES OF RECEIVING TUBES, drawing of ST-16 bulb with 4-pin base.

BOTTOM VIEW OF SOCKET CONNECTIONS

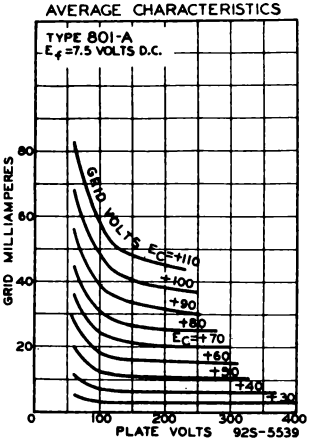


AA'=PLANE OF ELECTRODES

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: Plane of plate vertical (on edge).

AVERAGE CHARACTERISTICS

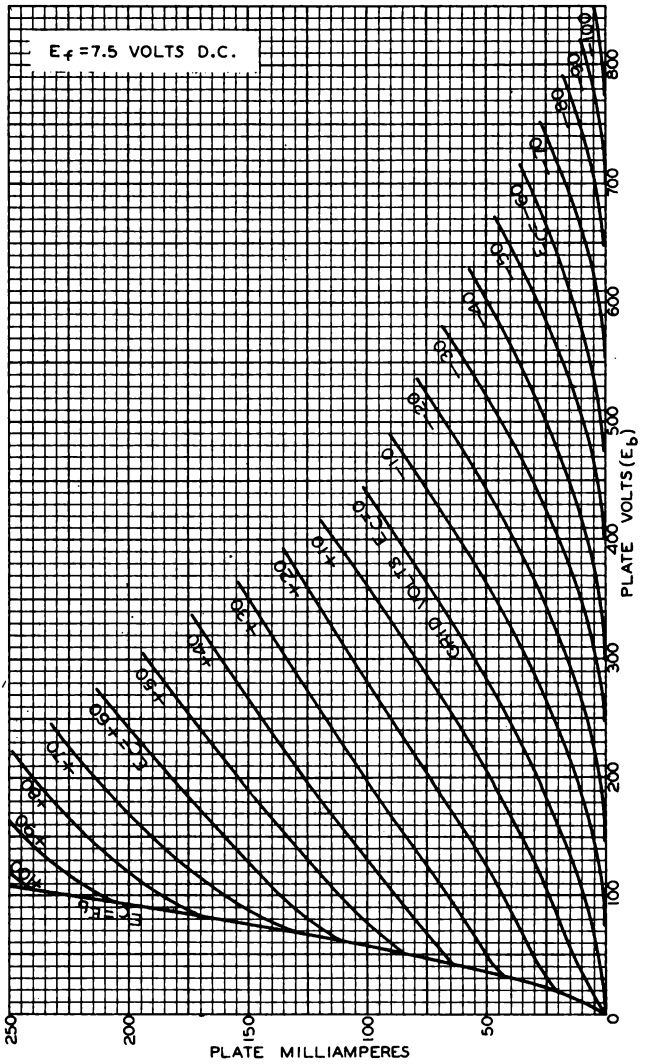


RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

801-A

801-A

AVERAGE PLATE CHARACTERISTICS



JULY 18, 1934

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

925—5538

802

R-F POWER AMPLIFIER PENTODE

Heater⊙	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.9	amp.
Transconductance for plate current of 20 ma.	2250	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate (With external shielding)	0.15 max.	μμf
Input	12	μμf
Output	8.5	μμf
Maximum Overall Length		5-3/4"
Maximum Diameter		2-1/16"
Bulb		ST-16
Cap		Small Metal
Base		Medium 7-Pin Bayonet

MAXIMUM CCS and ICAS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service
ICAS = Intermittent Commercial and Amateur Service

A-F POWER AMPLIFIER & MODULATOR - Class A

	CCS			ICAS	
D-C Plate Voltage	500 max.			600 max.	volts
D-C Screen Voltage (Grid #2)	250 max.			250 max.	volts
Plate Input	15 max.			18 max.	watts
Screen Input	3 max.			3 max.	watts
Typical Operation:					
D-C Plate Voltage	400	500	500	600	volts
Suppressor (Grid #3)	0*	0*	0*	40	volts
D-C Screen Voltage	250	175	225	250	volts
D-C Grid Volt. (Grid #1)□	-18	-10	-17	-18.5	volts
	450	325	530	490	ohms
Peak A-F Grid Volt.	18	10	17	18.5	volts
Internal Shield*	-	-	-	-	
D-C Plate Current	30	25	25	30	ma.
D-C Screen Current	10	6	7	8	ma.
Load Resistance	10000	18000	16000	13200	ohms
Total Har. Distortion	8	4	10	9	%
Power Output	5.5	4	6.5	7.6	watts

□ Obtained from fixed supply or by cathode resistor of value shown. The d-c resistance in the grid circuit should not exceed 10000 ohms with fixed bias, or 500000 ohms with cathode bias.
* Connected to cathode at socket.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	500 max.	600 max.	volts
D-C Suppressor Volt. (Grid #3)	200 max.	200 max.	volts
D-C Screen Voltage (Grid #2)	250 max.	250 max.	volts
D-C Plate Current	30 max.	30 max.	ma.
Plate Input	15 max.	18 max.	watts

⊙ In circuits where the cathode is not directly connected to the heater, the potential difference between them should not exceed 100 volts.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

802

R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

	CCS		ICAS	
Suppressor Input	2 max.		2 max.	watts
Screen Input	4 max.		4 max.	watts
Plate Dissipation	10 max.		13 max.	watts
Typical Operation:				
D-C Plate Voltage	400	500	600	volts
Suppressor * ★	-	-	-	
D-C Screen Voltage	150	200	225	volts
D-C Grid Voltage (Grid #1)	-22	-28	-30	volts
Peak R-F Grid Voltage	35	32	35	volts
Internal Shield *	-	-	-	
D-C Plate Current	25	25	30	ma.
D-C Screen Current	6.5	7	8	ma.
D-C Grid Cur. (Approx.)	1	0	0.5	ma.
Driving Power (Approx.) ○	0.5	0.18	0.18	watts
Power Output (Approx.)	2.75	3.5	5.3	watts

SUPPRESSOR-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

		CCS		ICAS	
D-C Plate Voltage		500 max.		600 max.	volts
D-C Screen Voltage (Grid #2)		200 max.		250 max.	volts
D-C Grid Voltage (Grid #1)		-200 max.		-200 max.	volts
D-C Plate Current		30 max.		30 max.	ma.
D-C Grid Current		7.5 max.		7.5 max.	ma.
Plate Input		15 max.		18 max.	watts
Screen Input		6 max.		6 max.	watts
Plate Dissipation		10 max.		13 max.	watts
Typical Operation:					
D-C Plate Voltage	400	500	500	600	volts
D-C Sup'r Volt. (Grid #3)	-40	-53	-45	-45	volts
D-C Screen Voltage △	8900	10700	10700	14500	volts
D-C Grid Voltage □	-85	-90	-90	-100	volts
	11000	18000	20000	20000	ohms
Peak A-F Sup'r Volt.	40	53	65	65	volts
Peak R-F Grid Volt.	125	125	125	125	volts
Internal Shield *	-	-	-	-	
D-C Plate Current	18	20	22	30	ma.
D-C Screen Current	28	28	28	24	ma.
D-C Grid Cur. (Approx.)	7.5	5	4.5	5	ma.
Driving Power (Approx.)	0.9	0.6	0.5	0.6	watts
Power Output (Approx.)	2	3	3.5	6.3	watts

△ Voltage taken from unmodulated plate-voltage supply through resistor of value shown.
□ From fixed supply or grid resistor of value shown.

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	500 max.	600 max.	volts

*, ★, ○: See next page.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

802

R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

	CCS		ICAS	
D-C Suppressor Volt. (Grid #3)	200 max.		200 max.	volts
D-C Screen Voltage (Grid #2)	250 max.		250 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.		-200 max.	volts
D-C Plate Current	30 max.		30 max.	ma.
Plate Input	15 max.		18 max.	watts
Suppressor Input	2 max.		2 max.	watts
Screen Input	4 max.		4 max.	watts
Plate Dissipation	10 max.		13 max.	watts
Typical Operation:				
D-C Plate Voltage	400	500	600	volts
Suppressor * ★	-	-	-	
D-C Screen Voltage	150	200	250	volts
D-C Grid Voltage	-105	-130	-130	volts
Peak A-F Grid Voltage	40	50	50	volts
Peak R-F Grid Voltage	125	145	145	volts
Internal Shield *	-	-	-	
D-C Plate Current	25	25	30	ma.
D-C Screen Current	7.5	8	8	ma.
D-C Grid Cur. (Approx.)	2	1	1	ma.
Driving Power (Approx.) o	1	0.8	0.8	watt
Power Output (Approx.)	3	4	6	watts

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Pentode Connection

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	400 max.	500 max.	volts
D-C Suppressor Volt. (Grid #3)	200 max.	200 max.	volts
D-C Screen Voltage (Grid #2)	200 max.	250 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.	-200 max.	volts
D-C Plate Current	40 max.	40 max.	ma.
D-C Grid Current	7.5 max.	7.5 max.	ma.
Plate Input	16 max.	20 max.	watts
Suppressor Input	2 max.	2 max.	watts
Screen Input	4 max.	4 max.	watts
Plate Dissipation	6.7 max.	8 max.	watts
Typical Operation:			
D-C Plate Voltage	400	500	volts
D-C Suppressor Voltage	40	40	volts
D-C Screen Voltage #	195	245	volts
	11500	16300	ohms
D-C Grid Voltage ▲	-40	-40	volts
	27000	27000	ohms
Peak R-F Grid Voltage	55	55	volts

★ Applying a positive voltage of not more than 40 volts to the suppressor gives slightly increased output.
o At crest of a-f cycle with modulation factor of 1.0.
From modulated fixed supply or modulated plate-voltage supply through resistor of value shown.
*, ▲: See next page.

802

R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

	CCS	ICAS	
Internal Shield*	–	–	
D-C Plate Current	35	40	ma.
D-C Screen Current	17	15	ma.
D-C Grid Cur. (Approx.)	1.5	1.5	ma.
Driving Power (Approx.)	0.1	0.1	watt
Power Output (Approx.)	8	12	watts

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Tetrode Connection - Grids #2 & #3 tied together

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	400 max.	500 max.	volts
D-C Screen Volt. (Grids #2 & #3)	200 max.	200 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.	-200 max.	volts
D-C Plate Current	40 max.	40 max.	ma.
D-C Grid Current	7.5 max.	7.5 max.	ma.
Plate Input	16 max.	20 max.	watts
Screen Input	6 max.	6 max.	watts
Plate Dissipation	6.7 max.	8 max.	watts
Typical Operation:			
D-C Plate Voltage	400	500	volts
D-C Screen Voltage△	85	195	volts
	15000	18000	ohms
D-C Grid Voltage▲	-120	-120	volts
	20000	20000	ohms
Peak R-F Grid Voltage	160	160	volts
Internal Shield*	–	–	
D-C Plate Current	35	40	ma.
D-C Screen Current	21	17	ma.
D-C Grid Current (Approx.)	6	6	ma.
Driving Power (Approx.)	0.9	0.9	watt
Power Output (Approx.)	8	12	watts

△ Preferably from unmodulated plate-voltage supply through resistor of value shown.
▲ Obtained by grid resistor of value shown or by partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Pentode Connection

Key-down conditions per tube without modulation

	CCS	ICAS	
D-C Plate Voltage	500 max.	600 max.	volts
D-C Suppressor Volt. (Grid #3)	200 max.	200 max.	volts
D-C Screen Volt. (Grid #2)	250 max.	250 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.	-200 max.	volts
D-C Plate Current	60 max.	60 max.	ma.
D-C Grid Current	7.5 max.	7.5 max.	ma.
Plate Input	25 max.	33 max.	ma.
Suppressor Input	2 max.	2 max.	watts

* Connected to cathode at socket.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

802

R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

	CCS			ICAS	
Screen Input		6 max.		6 max.	watts
Plate Dissipation		10 max.		13 max.	watts
Typical Operation:					
D-C Plate Voltage	400	500	500	600	volts
D-C Suppressor Volt.	0	0	40	40	volts
D-C Screen Volt. ♦	200	200	250	250	volts
	8000	13600	20800	22000	ohms
D-C Grid Volt. ¤	-100	-100	-100	-120	volts
	14000	17000	50000	42000	ohms
	1300	1370	1700	1620	ohms
Peak R-F Grid Volt.	155	155	155	165	volts
Internal Shield*	-	-	-	-	
D-C Plate Current	45	45	45	55	ma.
D-C Screen Current	25	22	12	16	ma.
D-C Grid Cur. (Approx.)	7	6	2	2.4	ma.
Driving Power (Approx.)	1.1	0.9	0.25	0.3	watt
Power Output (Approx.)	10	14	16	23	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Tetrode Connection - Grids #2 & #3 tied together
Key-down conditions per tube without modulation#

	CCS		ICAS	
D-C Plate Voltage		500 max.	600 max.	volts
D-C Screen Volt. (Grids #2 & #3)		200 max.	200 max.	volts
D-C Grid Voltage (Grid #1)		-200 max.	-200 max.	volts
D-C Plate Current		60 max.	60 max.	ma.
D-C Grid Current		7.5 max.	7.5 max.	ma.
Plate Input		25 max.	33 max.	watts
Screen Input		6 max.	6 max.	watts
Plate Dissipation		10 max.	13 max.	watts
Typical Operation:				
D-C Plate Voltage	400	500	600	volts
D-C Screen Volt. ♦	100	100	150	volts
	20000	27000	30000	ohms
D-C Grid Volt. ■	-60	-60	-60	volts
	8600	10000	10000	ohms
	1000	1000	860	ohms
Peak R-F Grid Volt.	90	90	90	volts
Internal Shield*	-	-	-	
D-C Plate Current	45	45	55	ma.
D-C Screen Current	15	15	15	ma.
D-C Grid Cur. (Approx.)	7	6	6	ma.
Driving Power (Approx.)	0.7	0.5	0.5	watt
Power Output (Approx.)	10	12	23	watts

■ Obtained by grid resistor (8600, 10000), by cathode resistor (1000, 860), or from fixed supply.
♦ From fixed supply or plate-voltage supply through resistor of value shown. Under key-up conditions, max. screen voltage should not exceed 500 volts. Series screen resistor of value shown should not be used except where the 802 is employed as a buffer amplifier and is not keyed.
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions. * Connected to cathode at socket. ¤ See next page.

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R-F POWER AMPLIFIER PENTODE

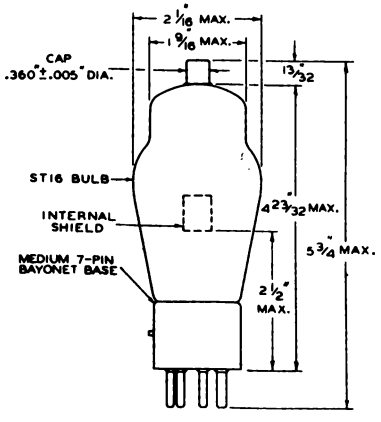
(continued from preceding page)

Obtained from grid resistor (14000, 17000, 50000, 42000), by cathode resistor (1300, 1370, 1700, 1620) or from fixed supply.

HIGH-FREQUENCY OPERATION

Maximum permissible percentage of maximum rated plate voltage and plate input

FREQUENCY (Mc)		30	55	100
TELEPHONY	Class B	100	88	76
	Class C, Grid-Mod.	100	88	76
	Class C, Sup'r-Mod.	100	88	76
	Class C, Plate-Mod.	100	77	55
TELEGRAPHY - Class C		100	77	55



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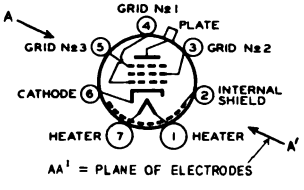
TOP VIEW OF SOCKET CONNECTIONS



AA' = PLANE OF ELECTRODES

TUBE MOUNTING POSITION
VERTICAL or HORIZONTAL

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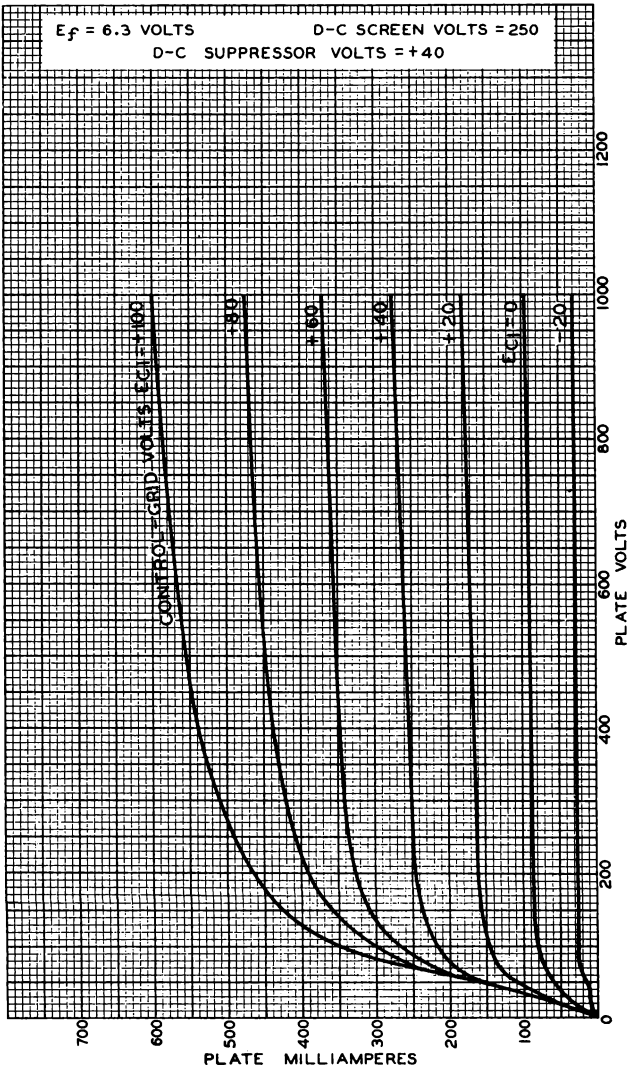
AVERAGE PLATE CHARACTERISTICS



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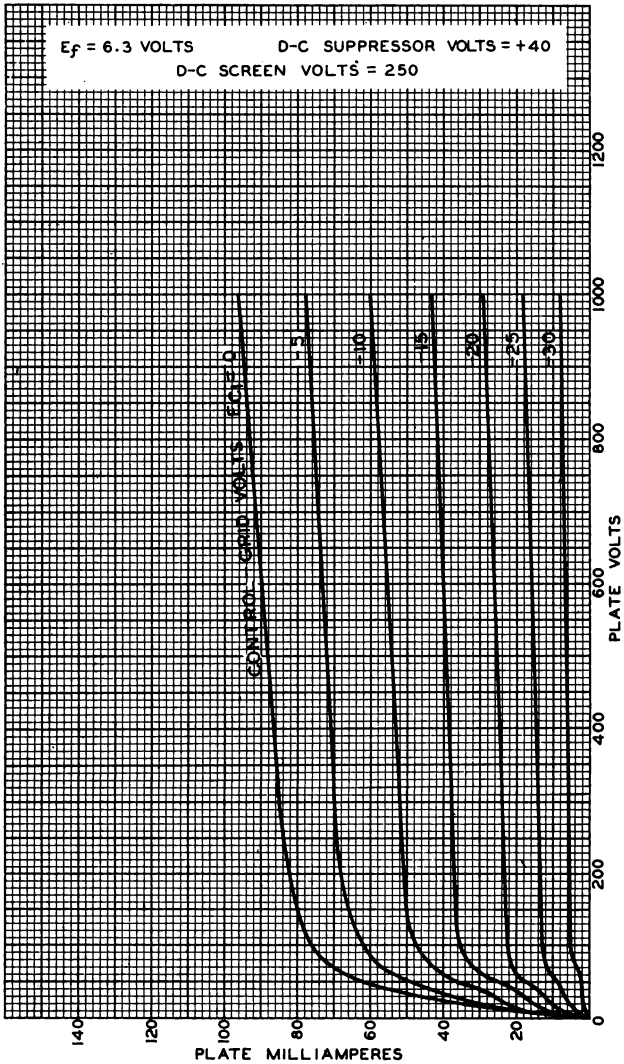
AVERAGE PLATE CHARACTERISTICS



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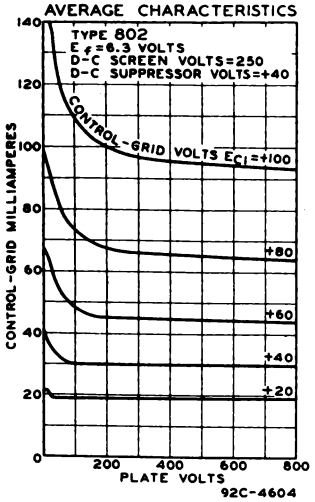
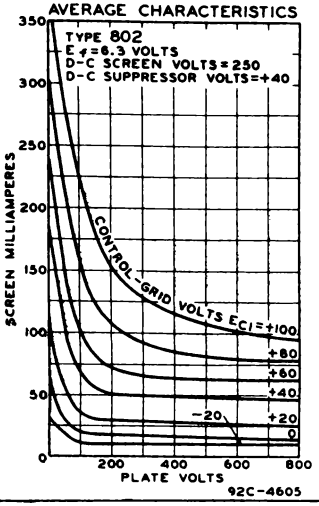
CHARACTERISTICS CURVES





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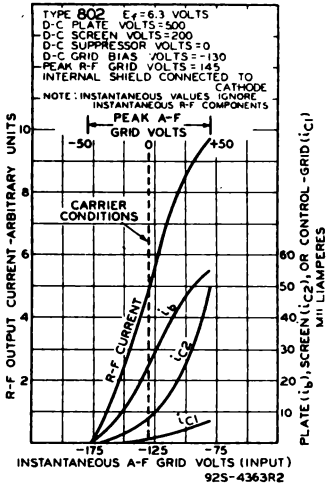
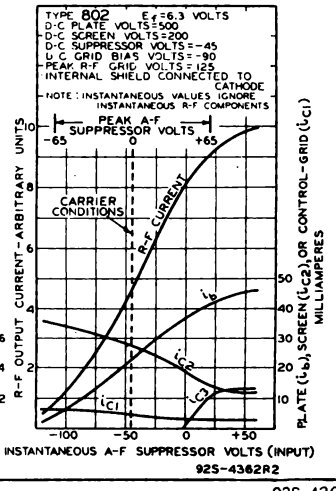
CHARACTERISTICS CURVES

CONTROL-GRID MODULATION CHARACTERISTICS



SUPPRESSOR MODULATION CHARACTERISTICS



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R-F POWER AMPLIFIER PENTODE

Filament	Thoriated Tungsten		
Voltage	10	a-c or d-c	volts
Current	5		amp.
Transconductance for plate current of 62.5 ma.	4000		μmhos
Direct Interelectrode Capacitances:			
Grid to Plate (with external shielding)	0.15 max.		μμf
Input	17		μμf
Output	29		μμf
Overall Length		9-1/16" ± 3/16"	←
Seated Height		8-5/16" ± 3/16"	
Maximum Diameter		2-9/16"	
Bulb		T-20	
Cap		Medium	
Base	Medium Shell Giant 5-Pin Micanol, Bayonet		←
RCA Socket		Stock No.9927	

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			2000	max.	volts
D-C Suppressor Voltage (Grid #3)			500	max.	volts
D-C Screen Voltage (Grid #2)			600	max.	volts
D-C Plate Current			160	max.	ma.
Plate Input			180	max.	watts
Suppressor Input			10	max.	watts
Screen Input			20	max.	watts
Plate Dissipation			125	max.	watts
Typical Operation:					
D-C Plate Voltage	1250	1500	2000		volts
D-C Suppressor Voltage	40	40	40		volts
D-C Screen Voltage**	500	550	600		volts
D-C Grid Voltage (Grid #1)●○	-30	-35	-40		volts ←
Peak R-F Grid Voltage	90	70	55		volts
D-C Plate Current	130	110	80		ma.
D-C Screen Current	33	30	20		ma.
D-C Grid Current	8	5	3	approx.	ma.
Driving Power*	4.5	3.0	1.5	approx.	watts
Power Output	52	53	53	approx.	watts

* At crest of a-f cycle with modulation factor of 1.0.

○ For a-c filament supply.

● Obtained from a fixed supply or from suitably by-passed cathode resistor. ←

SUPPRESSOR-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	2000	max.	volts
D-C Screen Voltage (Grid #2)	600	max.	volts
D-C Grid Voltage (Grid #1)	-500	max.	volts
D-C Plate Current	110	max.	ma.
D-C Grid Current	50	max.	ma.
Plate Input	180	max.	watts
Screen Input	30	max.	watts

← Indicates a change. **: See end of tabulation.

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

Plate Dissipation			125 max.	watts
Typical Operation:				
D-C Plate Voltage	1250	1500	2000	volts
D-C Suppressor Voltage	-70	-90	-110	volts
D-C Screen Voltage△	13000	17000	35000	ohms
→ D-C Grid Voltage□	-110	-100	-100	volts
	5000	5000	7000	ohms
Peak A-F Suppressor Volt.	110	130	150	volts
Peak R-F Grid Voltage	200	190	170	volts
D-C Plate Current	100	100	80	ma.
D-C Screen Current	70	70	48	ma.
D-C Grid Current	22	20	15	approx.ma.
Driving Power	4	3.5	2.5	approx.watts
Power Output	40	50	53	approx.watts

△ Voltage taken from unmodulated plate-voltage supply through resistor.

→ □ From fixed supply, grid resistor (5000, 5000, 7000), or cathode resistor.

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			2000 max.	volts
D-C Suppressor Voltage (Grid #3)			500 max.	volts
D-C Screen Voltage (Grid #2)			600 max.	volts
D-C Grid Voltage (Grid #1)			-500 max.	volts
D-C Plate Current			160 max.	ma.
Plate Input			180 max.	watts
Suppressor Input			10 max.	watts
Screen Input			20 max.	watts
Plate Dissipation			125 max.	watts
Typical Operation:				
D-C Plate Voltage	1250	1500	2000	volts
D-C Suppressor Voltage	40	40	40	volts
→ D-C Screen Voltage**	500	550	600	volts
D-C Grid Voltage	-100	-90	-80	volts
Peak R-F Grid Voltage	160	130	100	volts
Peak A-F Grid Voltage	75	65	50	volts
D-C Plate Current	130	110	80	ma.
D-C Screen Current	30	25	20	ma.
D-C Grid Current	8	6	4	approx.ma.
Driving Power*	4	3	2	approx.watts
Power Output	52	53	53	approx.watts

* At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Pentode Connection

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	1600 max.	volts
D-C Suppressor Voltage (Grid #3)	500 max.	volts
D-C Screen Voltage (Grid #2)	500 max.	volts
D-C Grid Voltage (Grid #1)	-500 max.	volts
D-C Plate Current	160 max.	ma.
D-C Grid Current	50 max.	ma.

** See end of tabulation. → Indicates a change.

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

Plate Input		250 max.	watts
Suppressor Input		10 max.	watts
Screen Input		20 max.	watts
Plate Dissipation		85 max.	watts
Typical Operation:			
D-C Plate Voltage	1250	1600	volts
D-C Suppressor Voltage	100	100	volts
D-C Screen Voltage #	18000	27000	ohms
	350	400	volts
D-C Grid Voltage ▲	-80	-80	volts
	4000	4000	ohms
Peak R-F Grid Voltage	200	190	volts
D-C Plate Current	150	150	ma.
D-C Screen Current	50	45	ma.
D-C Grid Current	30	25 approx.	ma.
Driving Power	6	5 approx.	watts
Power Output	120	155 approx.	watts

From modulated fixed supply or modulated plate-voltage supply through resistor.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Tetrode Connection - Grids #2 & #3 tied together

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		1600 max.	volts
D-C Screen Voltage (Grids #2 & #3)		500 max.	volts
D-C Grid Voltage (Grid #1)		-500 max.	volts
D-C Plate Current		160 max.	ma.
D-C Grid Current		50 max.	ma.
Plate Input		250 max.	watts
Screen Input		30 max.	watts
Plate Dissipation		85 max.	watts
Typical Operation:			
D-C Plate Voltage	1250	1600	volts
D-C Screen Voltage ##	15000	20000	ohms
	130	130	volts
D-C Grid Voltage ▲	-180	-180	volts
	4000	4000	ohms
Peak R-F Grid Voltage	305	320	volts
D-C Plate Current	150	150	ma.
D-C Screen Current	75	75	ma.
D-C Grid Current	45	45 approx.	ma.
Driving Power	15	15 approx.	watts
Power Output	125	155 approx.	watts

Preferably from unmodulated plate-voltage supply through resistor.

▲ Obtained from grid resistor of value shown, or by partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Pentode Connection

Key-down conditions per tube without modulation§

D-C Plate Voltage	2000 max.	volts
D-C Suppressor Voltage (Grid #3)	500 max.	volts

§ See next page.

← Indicates a change.

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

D-C Screen Voltage (Grid #2)			600 max.	volts
D-C Grid Voltage (Grid #1)			-500 max.	volts
D-C Plate Current			175 max.	ma.
D-C Grid Current			50 max.	ma.
Plate Input			350 max.	watts
Suppressor Input			10 max.	watts
Screen Input			30 max.	watts
Plate Dissipation			125 max.	watts
Typical Operation:				
D-C Plate Voltage	1250	1500	2000	volts
D-C Suppressor Voltage	40	40	40	volts
D-C Screen Voltage ♦	500	500	500	volts
D-C Grid Voltage ■	-90	-90	-90	volts
	415	415	415	ohms
	7500	7500	7500	ohms
Peak R-F Grid Voltage	175	175	175	volts
D-C Plate Current	160	160	160	ma.
D-C Screen Current	45	45	45	ma.
D-C Grid Current	12	12	12	approx.ma.
Driving Power	2	2	2	approx.watts
Power Output	130	160	210	approx.watts

■ Obtained from fixed supply, cathode resistor (415), by grid resistor (7500), or by combination methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Tetrode Connection - Grids #2 & #3 tied together

Key-down conditions per tube without modulation§

D-C Plate Voltage			2000 max.	volts
D-C Screen Voltage (Grids #2 & #3)			600 max.	volts
D-C Grid Voltage (Grid #1)			-500 max.	volts
D-C Plate Current			175 max.	ma.
D-C Grid Current			50 max.	ma.
Plate Input			350 max.	watts
Screen Input			30 max.	watts
Plate Dissipation			125 max.	watts
Typical Operation:				
D-C Plate Voltage	1250	1500	2000	volts
D-C Screen Voltage ♦	150	150	150	volts
D-C Grid Voltage ⊕	-90	-90	-90	volts
	445	445	445	ohms
	3500	3500	3500	ohms
Peak R-F Grid Voltage	190	190	190	volts
D-C Plate Current	160	160	160	ma.
D-C Screen Current	15	15	15	ma.
D-C Grid Current	28	27	26	approx.ma.
Driving Power	4.6	4.4	4.4	approx.watts
Power Output	130	160	210	approx.watts

♦ Use of series resistor is not recommended.

⊕ Obtained from fixed supply, cathode resistor (445), by grid resistor (3500), or by combination methods.

← Indicates a change. §, **: See next page.

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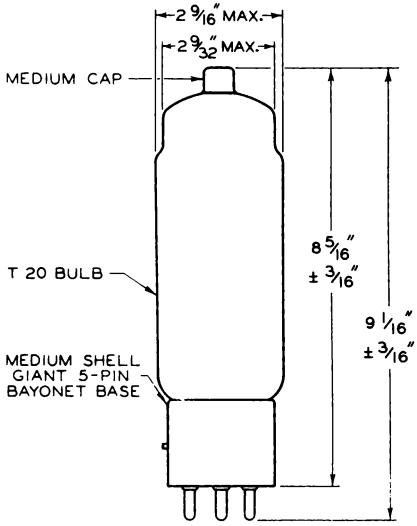
R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

§ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier condition.

** Preferably obtained from a separate source, or from the plate-voltage supply with a voltage divider.

Data on operating frequencies for the 803 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

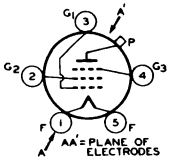


TUBE MOUNTING POSITION

VERTICAL: Base up or down.

92CM-4424R3

BOTTOM VIEW OF SOCKET CONNECTIONS



Pin 1 - Filament
Pin 2 - Grid No.2
Pin 3 - Grid No.1
Pin 4 - Grid No.3
Pin 5 - Filament
Cap - Plate

5J

← Indicates a change.

R-F POWER AMPLIFIER PENTODE

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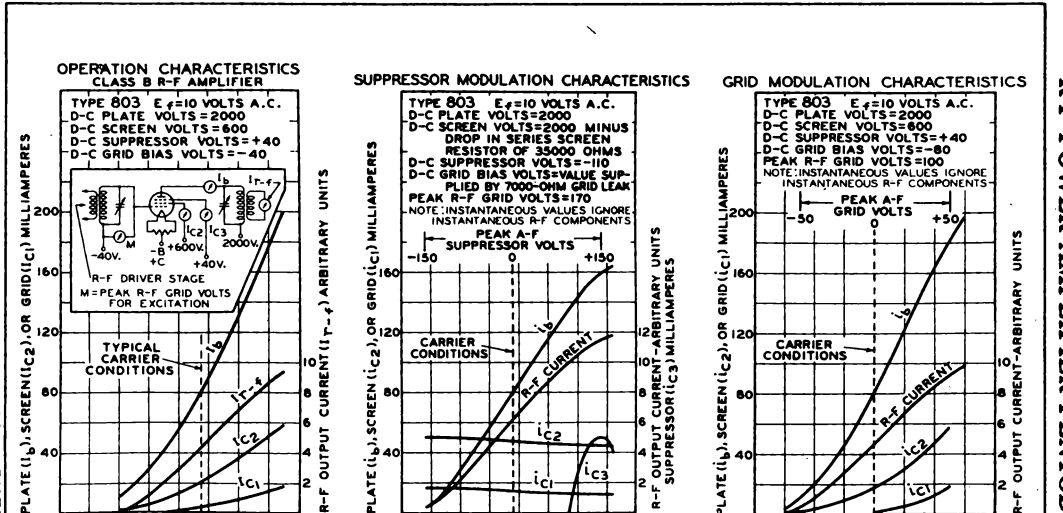

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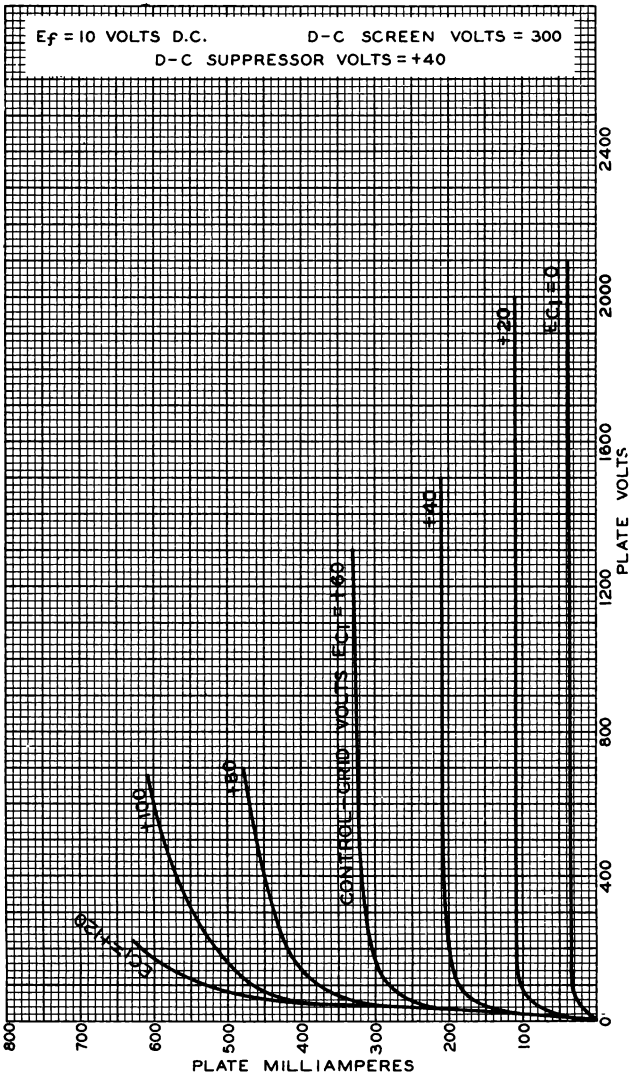
AVERAGE PLATE CHARACTERISTICS



MAR. 8, 1937

RCA RADIOTRON DIVISION
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92C-4749

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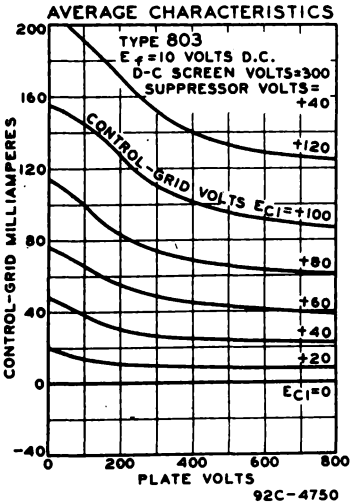
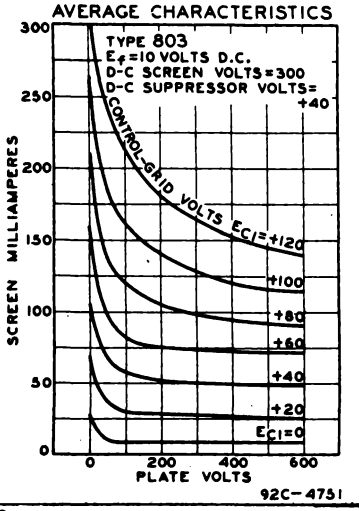
CHARACTERISTICS CURVES





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R-F POWER AMPLIFIER PENTODE

Filament	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	3.0	amp.
Transconductance for plate current of 32 ma.	3250	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate (with external shielding)	0.01 max.	μμf
Input	16	μμf
Output	14.5	μμf
Maximum Overall Length		7-3/4"
Maximum Diameter		2-1/16"
Bulb		T-16
Cap		Small Metal
Base		Medium 5-Pin, "Micanol"

MAXIMUM CCS and ICAS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service
ICAS = Intermittent Commercial and Amateur Service

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

				CCS	ICAS	
D-C Plate Voltage				1250 max.	1500 max.	volts
D-C Suppressor Volt. (Grid #3)				200 max.	200 max.	volts
D-C Screen Voltage (Grid #2)				300 max.	300 max.	volts
D-C Plate Current				50 max.	50 max.	ma.
Plate Input				60 max.	75 max.	watts
Suppressor Input				5 max.	5 max.	watts
Screen Input				10 max.	10 max.	watts
Plate Dissipation				40 max.	50 max.	watts
Typical Operation:						
Filament Volt.	7.5	7.5	7.5		7.5	a-c volts
D-C Plate Volt.	1000	1000	1250		1500	volts
D-C Suppressor Volt.	0	45	45		45	volts
D-C Screen Volt.	300	300	300		300	volts
D-C Grid Volt. (Grid #1)	-20	-20	-20		-26	volts
Peak R-F Grid Volt.	30	30	27		40	volts
D-C Plate Current	45	45	45		50	ma.
D-C Screen Current	12	11.5	11		12	ma.
D-C Grid Cur. (Approx.)	1	1	1		1.5	ma.
Driving Power (Approx.)°	0.35	0.3	0.25		0.5	watt
Power Output (Approx.)	11	12	16		28	watts

° At crest of a-f cycle with a modulation factor of 1.0.

SUPPRESSOR-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	1250 max.	1500 max.	volts
D-C Screen Volt. (Grid #2)	300 max.	300 max.	volts
D-C Grid Voltage (Grid #1)	-300 max.	-300 max.	volts
D-C Plate Current	50 max.	50 max.	ma.

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

	CCS		ICAS		
D-C Grid Current	15 max.		15 max.		ma.
Plate Input	60 max.		75 max.		watts
Screen Input	15 max.		15 max.		watts
Plate Dissipation	40 max.		50 max.		watts
Typical Operation:					
Filament Voltage	7.5	7.5	7.5	a-c	volts
D-C Plate Voltage	1000	1250	1500		volts
D-C Sup'r Volt. (Grid #3)	-35	-50	-50		volts
D-C Screen Volt. ●	21000	27000	37500		ohms
D-C Grid Voltage □	-100	-100	-115		volts
	18200	14300	16400		ohms
Peak A-F Sup'r Volt.	60	70	75		volts
Peak R-F Grid Volt.	140	140	150		volts
D-C Plate Current	45	48	50		volts
D-C Screen Current	33.5	35.5	32		volts
D-C Grid Cur. (Approx.)	5.5	7	7		ma.
Driving Power (Approx.)	0.7	0.85	0.95		watts
Power Output (Approx.)	16	21	28		watts

● From unmodulated plate-voltage supply through resistor of value shown.
□ From fixed supply or grid resistor of value shown.

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS			ICAS		
D-C Plate Voltage	1250 max.			1500 max.		volts
D-C Suppressor Volt. (Grid #3)	200 max.			200 max.		volts
D-C Screen Voltage (Grid #2)	300 max.			300 max.		volts
D-C Grid Voltage (Grid #1)	-300 max.			-300 max.		volts
D-C Plate Current	50 max.			50 max.		ma.
Plate Input	60 max.			75 max.		watts
Suppressor Input	5 max.			5 max.		watts
Screen Input	10 max.			10 max.		watts
Plate Dissipation	40 max.			50 max.		watts
Typical Operation:						
Filament Voltage	7.5	7.5	7.5	7.5	a-c	volts
D-C Plate Voltage	1000	1000	1250	1500		volts
D-C Suppressor Volt.	0	45	45	45		volts
D-C Screen Volt.	300	300	300	300		volts
D-C Grid Volt.	-115	-115	-115	-130		volts
Peak R-F Grid Volt.	140	135	135	140		volts
Peak A-F Grid Volt.	35	35	35	40		volts
D-C Plate Current	45	45	45	50		ma.
D-C Screen Current	15	11	11	13.5		ma.
D-C Grid Cur. (Approx.)	2	2	2	3.7		ma.
Driving Power (Approx.) *	1.1	0.85	0.85	1.3		watts
Power Output (Approx.)	14	16	21	28		watts

* At crest of a-f cycle with a modulation factor of 1.0.

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Pentode Connection

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	1000 max.	1250 max.	volts
D-C Suppressor Volt. (Grid #3)	200 max.	200 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	300 max.	volts
D-C Grid Voltage (Grid #1)	-300 max.	-300 max.	volts
D-C Plate Current	80 max.	80 max.	ma.
D-C Grid Current	15 max.	15 max.	ma.
Plate Input	80 max.	100 max.	watts
Suppressor Input	5 max.	5 max.	watts
Screen Input	10 max.	10 max.	watts
Plate Dissipation	27 max.	35 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5	a-c volts
D-C Plate Voltage	1000	1250	volts
D-C Suppressor Voltage	50	50	volts
D-C Screen Voltage oo	220	250	volts
	37000	50000	ohms
D-C Grid Voltage ▲	-90	-90	volts
	15000	15000	ohms
Peak R-F Grid Voltage	130	140	volts
D-C Plate Current	75	75	ma.
D-C Screen Current	21	20	ma.
D-C Grid Cur. (Approx.)	6	6	ma.
Driving Power (Approx.)	0.65	0.75	watt
Power Output (Approx.)	50	65	watts

oo From modulated fixed supply or modulated plate-voltage supply through resistor of value shown.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Tetrode Connection - Grids #2 & #3 tied together

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	1000 max.	1250 max.	volts
D-C Screen Volt. (Grids #2 & #3)	200 max.	200 max.	volts
D-C Grid Voltage (Grid #1)	-300 max.	-300 max.	volts
D-C Plate Current	80 max.	80 max.	ma.
D-C Grid Current	15 max.	15 max.	ma.
Plate Input	80 max.	100 max.	watts
Screen Input	15 max.	15 max.	watts
Plate Dissipation	27 max.	35 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5	a-c volts
D-C Plate Voltage	1000	1250	volts
D-C Screen Voltage #	155	170	volts
	30000	45000	ohms

Preferably from unmodulated plate-voltage supply through resistor of value shown.
▲ See next page.

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

	CCS	ICAS	
D-C Grid Voltage▲	-80	-80	volts
	10000	10000	ohms
Peak R-F Grid Volt.	145	145	volts
D-C Plate Current	75	75	ma.
D-C Screen Current	28	24	ma.
D-C Grid Cur. (Approx.)	8	8	ma.
Driving Power (Approx.)	1.1	1.1	watts
Power Output (Approx.)	50	65	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Pentode Connection

Key-down conditions per tube without modulation##

	CCS	ICAS	
D-C Plate Voltage	1250 max.	1500 max.	volts
D-C Suppressor Volt. (Grid #3)	200 max.	200 max.	volts
D-C Screen Volt. (Grid #2)	300 max.	300 max.	volts
D-C Grid Voltage (Grid #1)	-300 max.	-300 max.	volts
D-C Plate Current	95 max.	100 max.	ma.
D-C Grid Current	15 max.	15 max.	ma.
Plate Input	120 max.	150 max.	watts
Suppressor Input	5 max.	5 max.	watts
Screen Input	15 max.	15 max.	watts
Plate Dissipation	40 max.	50 max.	watts

Typical Operation:

Filament Voltage	7.5	7.5	7.5	7.5	a-c volts
D-C Plate Voltage	1000	1250	1250	1500	volts
D-C Sup'r Voltage	45	0	45	45	volts
D-C Screen Volt.♦	300	300	300	300	volts
	24000	28800	35200	34000	ohms
D-C Grid Volt.■	-100	-100	-100	-100	volts
	14300	14300	14300	14300	ohms
Peak R-F Grid Volt.	150	145	150	180	volts
D-C Plate Current	92	80	92	100	ma.
D-C Screen Current	29	33	27	35	ma.
D-C Grid Cur. (Approx.)	7	7	7	7	ma.
Driving Power (Approx.)	0.95	0.9	0.95	1.95	watts
Power Output (Approx.)	60	64	80	110	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Tetrode Connection - Grids #2 & #3 tied together

Key-down conditions per tube without modulation##

	CCS	ICAS	
D-C Plate Voltage	1250 max.	1500 max.	volts
D-C Screen Volt. (Grids #2 & #3)	200 max.	200 max.	volts

▲ Obtained by grid resistor of value shown or by partial self-bias methods.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

♦, ■; See next page.

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

	CCS	ICAS	
D-C Grid Volt (Grid #1)	-300 max.	-300 max.	volts
D-C Plate Current	95 max.	100 max.	ma.
D-C Grid Current	15 max.	15 max.	ma.
Plate Input	120 max.	150 max.	watts
Screen Input	15 max.	15 max.	watts
Plate Dissipation	40 max.	50 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5 a-c	volts
D-C Plate Voltage	1250	1500	volts
D-C Screen Voltage ♦	180	200	volts
	46700	43500	ohms
D-C Grid Voltage ■	-100	-100	volts
	12500	7700	ohms
Peak R-F Grid Voltage	160	190	volts
D-C Plate Current	92	100	ma.
D-C Screen Current	23	30	ma.
D-C Grid Cur. (Approx.)	8	12	ma.
Driving Power (Approx.)	1.2	2.2	watts
Power Output (Approx.)	80	110	watts

♦ From fixed supply of value shown. Regulation of fixed supply should be adequate to limit the screen voltage, under key-up conditions, to 600 volts. Series screen resistor of value shown should not be used except where the 804 is employed as a buffer amplifier and is not keyed.

■ Obtained by grid resistor of value shown or by other self- or fixed-bias method.

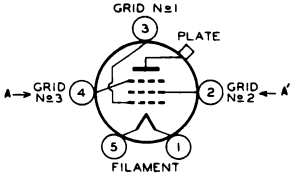
For the 804 as a crystal-controlled oscillator, typical operating conditions are: d-c plate volts, 1250; d-c suppressor volts, 0; d-c screen volts, 300; grid resistor, 30000 ohms; d-c plate ma., 42; and d-c screen ma., 24.

HIGH-FREQUENCY OPERATION

Maximum permissible percentage of maximum rated plate voltage and plate input

FREQUENCY (Mc)		15	35	80
TELEPHONY	Class C	100	88	76
	Class C, Grid-Mod.	100	88	76
	Class C, Sup'r-Mod.	100	88	76
	Class C, Plate-Mod.	100	75	50
TELEGRAPHY - Class C		100	75	50

TOP VIEW OF SOCKET CONNECTIONS



AA' = PLANE OF ELECTRODES

OUTLINE DIMENSIONS of the 804 are the same as those for the 814.

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: Plane of electrodes vertical.

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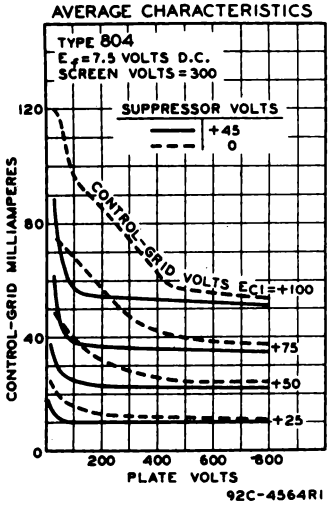
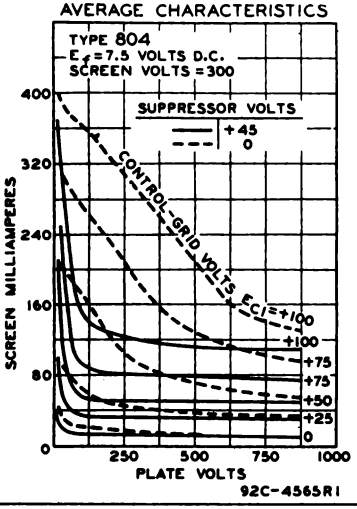
R-F POWER AMPLIFIER PENTODE





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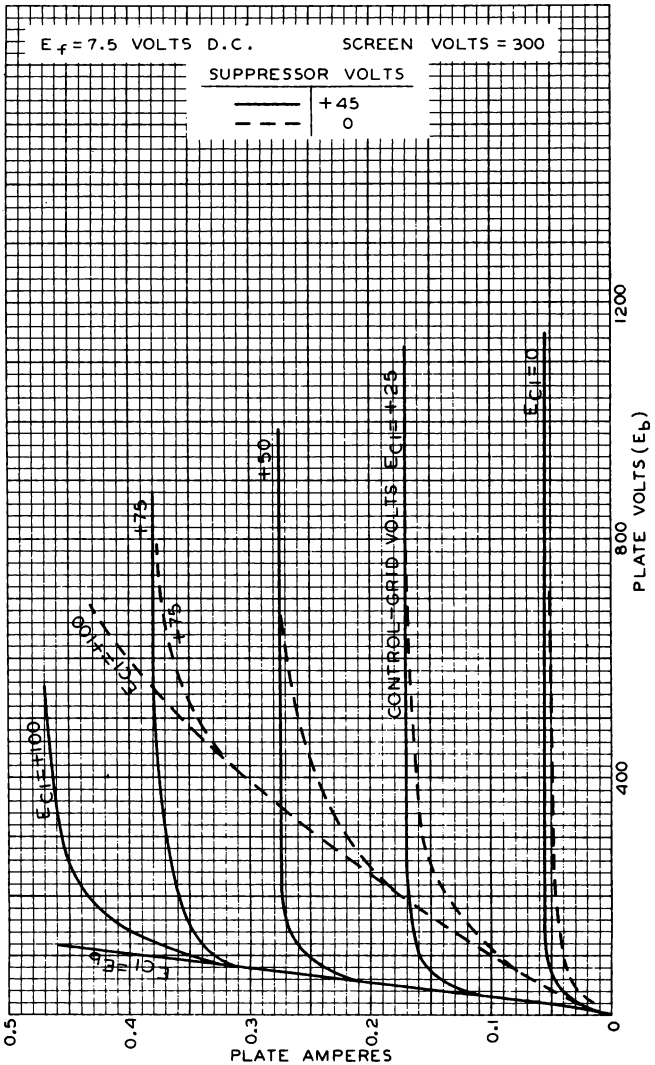
AVERAGE PLATE CHARACTERISTICS



DEC. 6, 1939

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4562R1

R-F POWER AMPLIFIER PENTODE

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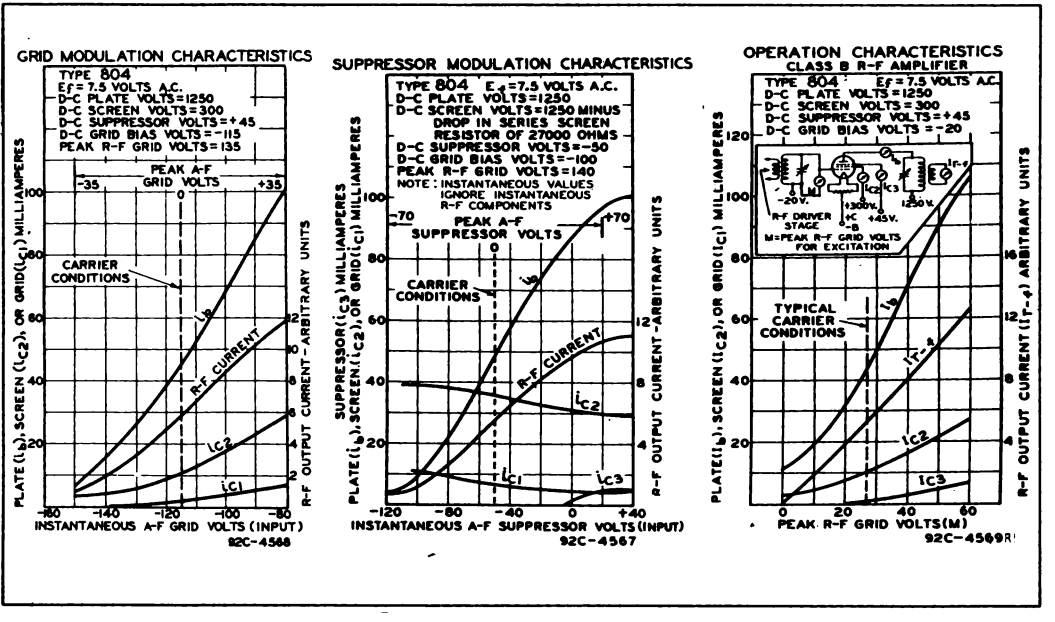

FEB. 2, 1940
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.
92C-4567, 4568 & 4569R1

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R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	6.5	μμf
Grid to Filament	8.5	μμf
Plate to Filament	10.5	μμf
Maximum Overall Length		8-1/2"
Maximum Diameter		2-5/16"
Bulb		T-18
Cap		Medium Metal
Base		Jumbo 4-Large Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage		1500 max.	volts
Max-Signal D-C Plate Current *		210 max.	ma.
Max-Signal Plate Input *		315 max.	watts
Plate Dissipation *		125 max.	watts
Typical Operation - 2 tubes:			
Unless otherwise specified, values are for 2 tubes.			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	1250	1500	volts
D-C Grid Voltage	0	-16	volts
Peak A-F Grid-to-Grid Voltage	235	280	volts
Zero-Sig. D-C Plate Current	148	84	ma.
Max-Sig. D-C Plate Current	400	400	ma.
Load Resistance (per tube)	1675	2050	ohms
Effective Load Res. (plate to plate)	6700	8200	ohms
Max-Signal Driving Power	6	7	approx. watts
Max-Signal Power Output	300 **	370#	approx. watts

* Averaged over any audio-frequency cycle.

** With 4% harmonic distortion approx.

\# With 3% harmonic distortion approx.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		1500 max.	volts
D-C Plate Current		150 max.	ma.
Plate Input		185 max.	watts
Plate Dissipation		125 max.	watts
Typical Operation:			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	1250	1500	volts
D-C Grid Voltage	0	-10	volts
Peak R-F Grid Voltage	75	70	volts
D-C Plate Current	135	115	ma.
D-C Grid Current **	15	15	approx. ma.
Driving Power ** °	11	7.5	approx. watts
Power Output	55	57.5	approx. watts

° At crest of a-f cycle with modulation factor of 1.0.

** See next page. (continued on next page)

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R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			1250 max.	volts
D-C Grid Voltage			-500 max.	volts
D-C Plate Current			175 max.	ma.
D-C Grid Current			70 max.	ma.
Plate Input			220 max.	watts
Plate Dissipation			85 max.	watts
Typical Operation:				
Filament Voltage		10	10	a-c volts
D-C Plate Voltage		1000	1250	volts
D-C Grid Voltage		-155	-160	volts
Peak R-F Grid Voltage		295	300	volts
D-C Plate Current		160	160	ma.
D-C Grid Current **		60	60	approx.ma.
Driving Power **		16	16	approx.watts
Power Output		110	140	approx.watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage			1500 max.	volts
D-C Grid Voltage			-500 max.	volts
D-C Plate Current			210 max.	ma.
D-C Grid Current			70 max.	ma.
Plate Input			315 max.	watts
Plate Dissipation			125 max.	watts
Typical Operation:				
Filament Voltage	10	10	10	a-c volts
D-C Plate Voltage	1000	1250	1500	volts
D-C Grid Voltage	-95	-100	-105	volts
Peak R-F Grid Voltage	225	230	235	volts
D-C Plate Current	200	200	200	ma.
D-C Grid Current **	40	40	40	approx.ma.
Driving Power **	8.5	8.5	8.5	approx.watts
Power Output	130	170	215	approx.watts

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

For use of the 805 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

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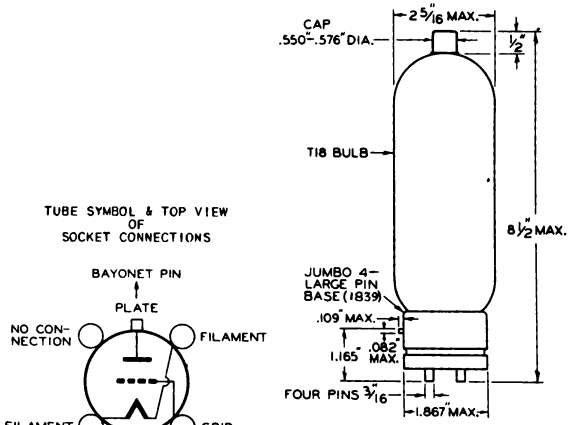
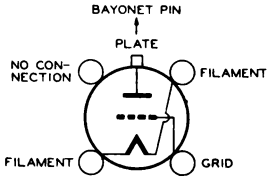
R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(continued from preceding page)



TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



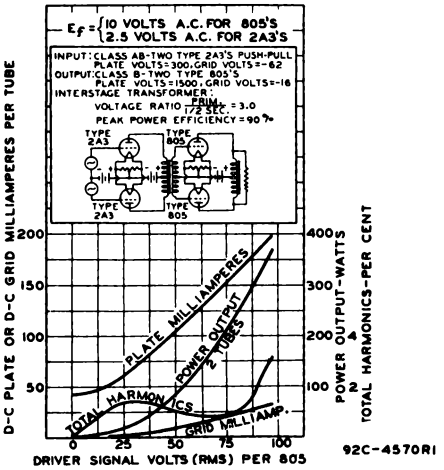
FOR PLATE FAMILY, REFER TO CURVE 92C-4404 UNDER TYPE 838.

← Indicates a change

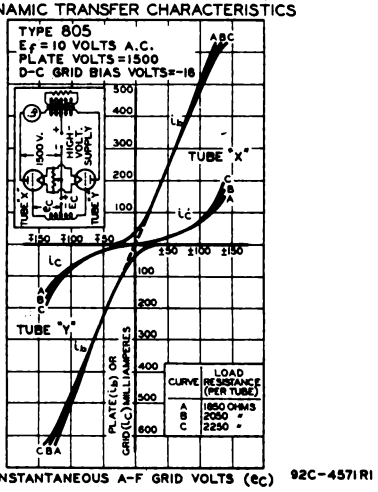
805

R-F POWER AMPLIFIER, OSCILLATOR CLASS B MODULATOR

OPERATION CHARACTERISTICS



DYNAMIC TRANSFER CHARACTERISTICS



806
R-F POWER AMPLIFIER, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	5.0	a-c or d-c volts
Current	9.5	amp. ←
Amplification Factor	12.6	
Direct Interelectrode Capacitances:		←
Grid to Plate	4.0	μμf
Grid to Filament	5.5	μμf
Plate to Filament	0.4	μμf
Maximum Overall Length		10"
Maximum Diameter		3-13/16"
Bulb		GT-30
Cap (Top)		Skirted Medium
Cap (Side)		Saddle Medium
Base		Jumbo 4-Pin
RCA Socket		Stock No. 9936 ←

Cooling—Forced ventilation from fan directed at middle and upper portions of bulb is required for continuous key-down conditions in class C telegraph service and is recommended for other services at frequencies of 30 Mc or higher.

Maximum Ratings Are Absolute Values

MAXIMUM CCS and ICAS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service
ICAS = Intermittent Commercial and Amateur Service

A-F POWER AMPLIFIER & MODULATOR - Class B

	CCS	ICAS	
D-C Plate Voltage	3000 max.	3300 max.	volts
Max.-Sig. D-C Plate Cur.[oo]	200 max.	250 max.	ma.
Max.-Sig. Plate Input[oo]	500 max.	825 max.	watts ←
Plate Dissipation[oo]	150 max.	225 max.	watts

Typical Operation:
Unless otherwise specified, values are for 2 tubes

D-C Plate Voltage	2000	3000	3300	volts
D-C Grid Voltage	-140	-230	-240	volts
Peak A-F Grid-to-Grid Volt.	660	770	930	volts
Zero-Sig. D-C Plate Cur.	80	50	80	ma.
Max.-Sig. D-C Plate Cur.	390	330	475	ma.
Load Res. (per tube)	4500	5200	4000	ohms
Effective Load Res. (plate to plate)	18000	20800	16000	ohms
Max.-Sig. Driving Power (Approx.)	19	15	35	watts
Max.-Sig. Power Output (Approx.)	535	700	1120	watts

[oo] Averaged over any audio-frequency cycle of sine-wave form.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	3000 max.	3300 max.	volts
D-C Plate Current	150 max.	150 max.	ma.
Plate Input	225 max.	338 max.	watts

← Indicates a change.

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R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

	CCS		ICAS	
Plate Dissipation	150 max.		225 max.	watts
Typical Operation:				
D-C Plate Voltage	2000	3000	3300	volts
D-C Grid Voltage	-150	-240	-280	volts
Peak R-F Grid Voltage	180	200	290	volts
D-C Plate Current	110	70	102	ma.
D-C Grid Cur. (Approx.)**	1	0	0	ma.
Driving Power (Approx.)** °	8	5	10.3	watts
Power Output (Approx.)	70	70	115	watts

° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS		ICAS	
D-C Plate Voltage	2500 max.		3000 max.	volts
D-C Grid Voltage	-1000 max.		-1000 max.	volts
D-C Plate Current	200 max.		200 max.	ma.
D-C Grid Current	50 max.		50 max.	ma.
Plate Input	500 max.		600 max.	watts
Plate Dissipation	110 max.		150 max.	watts
Typical Operation:				
D-C Plate Voltage	2000	2500	3000	volts
D-C Grid Voltage §	-500	-600	-670	volts
	12500	15000	25000	ohms
Peak R-F Grid Volt.	790	890	970	volts
D-C Plate Current	195	195	195	ma.
D-C Grid Cur. (Approx.)**	40	40	27	ma.
Driving Power (Approx.)**	28	32	24	watts
Power Output (Approx.)	300	390	460	watts

§ Obtained by grid resistor of value shown or by partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy□

Key-down conditions per tube without modulation##

	CCS		ICAS	
D-C Plate Voltage	3000 max.		3300 max.	volts
D-C Grid Voltage	-1000 max.		-1000 max.	volts
→ D-C Plate Current	200 max.		305 max.	ma.
D-C Grid Current	50 max.		50 max.	ma.
Plate Input	600 max.		1000 max.	watts
Plate Dissipation	150 max.		225 max.	watts
Typical Operation:				
D-C Plate Volt.	2000	2500	3000	3300	volts
D-C Grid Volt.★	-400	-500	-600	-600	volts
	16000	20000	24000	15000	ohms
	1800	2300	2700	1730	ohms

□ See "Cooling" under this type. ** See next page.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

→ Indicates a change.

★ Obtained by grid resistor (16000, 20000, 24000, 12800), by cathode resistor (1800, 2300, 2700, 1730), or from fixed-bias source.

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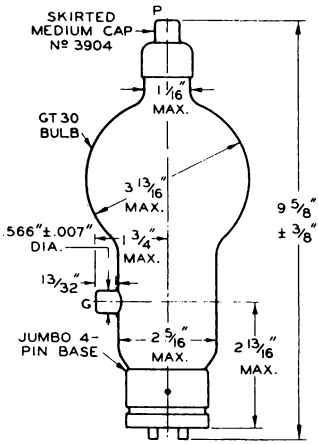
R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

	CCS			ICAS	
Peak R-F Grid Volt.	640	755	870	930	volts
D-C Plate Current	195	195	195	300	ma.
D-C Grid Cur. (Approx.)**	25	25	25	40	ma.
Driving Power (Approx.)**	15	17	20	34	watts
Power Output (Approx.)	280	370	450	780	watts

** Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

Data on operating frequencies for the 806 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

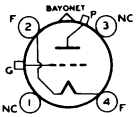


TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

92CM-4681R3

BOTTOM VIEW OF SOCKET CONNECTIONS



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F - FILAMENT
G - GRID
NC - NO CONNECTION
P - PLATE

← Indicates a change.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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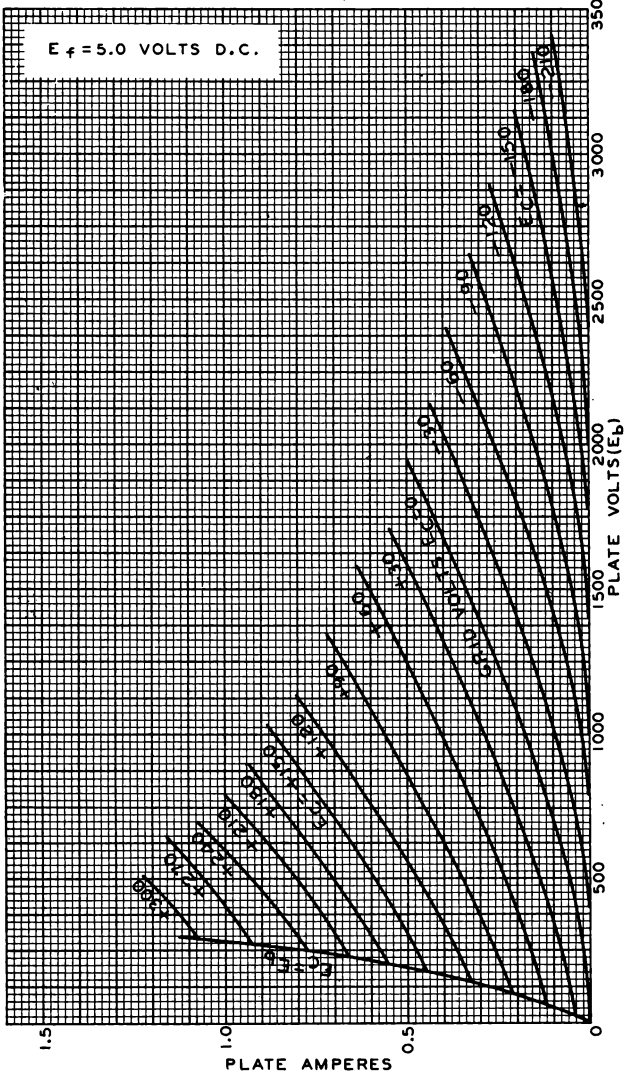
AVERAGE PLATE CHARACTERISTICS



DEC. 1, 1943

RCA VICTOR DIVISION

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92CM-4690

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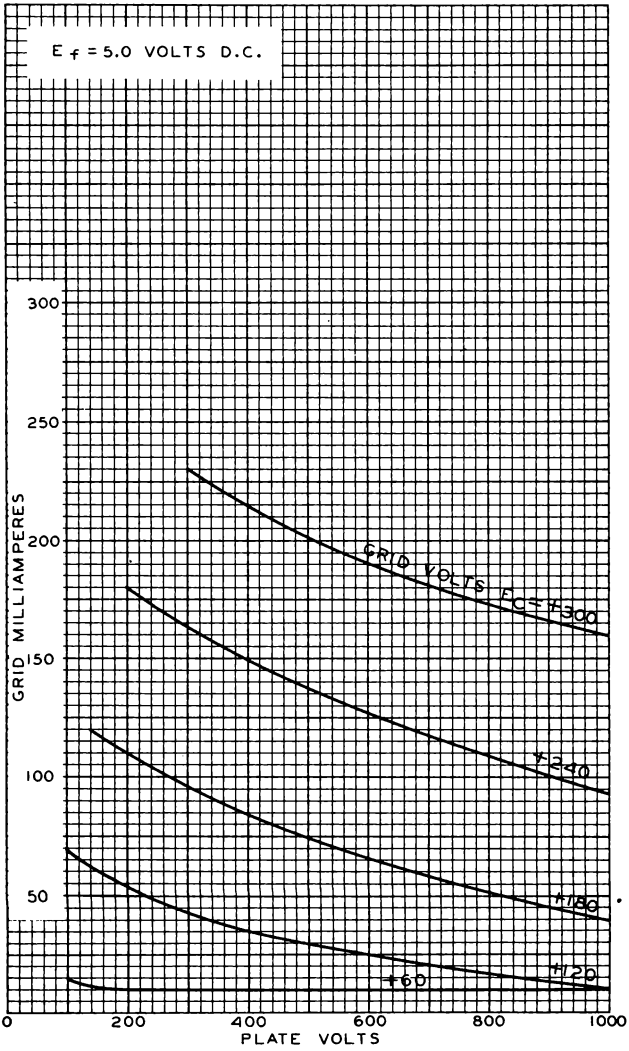
TYPICAL CHARACTERISTICS



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BEAM POWER TUBE

Useful at Frequencies up to 125 Mc

GENERAL DATA

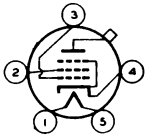
Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 0.6	ac or dc volts
Current	0.9	amp
Transconductance (Approx.) for plate volts = 250, grid-No.2 volts = 250, grid-No.1 volts = -14	6000	μmhos ←
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 250, grid-No.2 volts = 250, and grid-No.1 volts = -20	8	←
Direct Interelectrode Capacitances:		
Grid No.1 to plate°	0.2 max.	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	12	μμf
Plate to cathode & grid No.3, grid No.2, and heater	7	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	5-3/4"
Seated Length	4-31/32" ± 5/32"
Maximum Diameter	2-1/16"
Weight (Approx.)	3 oz ←
Bulb	ST-16
Cap	Small (JETEC No.C1-1) ←
Base	Medium-Micanol-Shell Small 5-Pin (JETEC No.A5-11) ←
Basing Designation for BOTTOM VIEW	5AW

Pin 1 - Heater
Pin 2 - Grid No.2
Pin 3 - Grid No.1



Pin 4 - Cathode, Grid No.3
Pin 5 - Heater
Cap - Plate

AF POWER AMPLIFIER & MODULATOR - Class AB_1♦

Triode Connection--Grid No.2 Connected to Plate

Maximum Ratings, *Absolute Values*:

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	400 max.	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*.	125 max.	125 max.	ma
MAX.-SIGNAL DC PLATE PLUS GRID-No.2 INPUT*	50 max.	50 max.	watts
PLATE DISSIPATION PLUS GRID-No.2 INPUT*	25 max.	30 max.	watts

° With external shield JETEC No.312.

♦, ●, ●●, *: See next page. ← Indicates a change.

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BEAM POWER TUBE

	CCS●	ICAS●●	
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts

Typical Operation:●	CCS●	ICAS●●	
Values are for 2 tubes			
DC Plate Voltage	400	400	volts
DC Grid-No.1 (Control-Grid) Voltage.	-45	-45	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage●●.	90	90	volts
→ Zero-Signal DC Plate Current .	64	64	ma
Max.-Signal DC Plate Current .	140	140	ma
Effective Load Resistance (Plate to Plate)	3000	3000	ohms
Max.-Signal Driving Power (Approx.).	0	0	watts
Max.-Signal Power Output (Approx.).	15	15	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance:○○		
With fixed bias.	0.1 max.	megohm
With cathode bias.	0.5 max.	megohm

AF POWER AMPLIFIER & MODULATOR - Class AB_1♦

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	300 max.	300 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*.	120 max.	120 max.	ma
MAX.-SIGNAL DC PLATE INPUT*. .	60 max.	90 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT* .	3.5 max.	3.5 max.	watts
PLATE DISSIPATION*	25 max.	30 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts

♦ Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

● In class AB_1 service, the normal design limitation is the requirement that grid-No.1 current should not flow. For this reason, the typical operating values shown for both CCS and ICAS conditions are the same.

●● The driver stage should be capable of supplying the No.1 grids of the class AB_1 stage with the specified driving voltage at low distortion.

●,●●,*,○○: See next page. →Indicates a change.

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BEAM POWER TUBE

Typical Operation:	CCS●			ICAS●●	
Values are for 2 tubes					
DC Plate Voltage	400	500	600	750	volts
DC Grid-No.2 Voltage** .	300	300	300	300	volts
DC Grid-No.1 (Control-Grid) Voltage:					
From fixed-bias source	-30	-32	-34	-35	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage. . .	60	64	68	70	volts
Zero-Signal DC Plate Current.	56	44	36	30	ma
Max.-Signal DC Plate Current.	143	141	139	139	ma
Zero-Signal DC Grid-No.2 Current. . .	2	1	0.6	0.5	ma
Max.-Signal DC Grid-No.2 Current. . .	16	15	15	16	ma
Effective Load Resistance (Plate to plate) . . .	6800	8200	10000	12000	ohms
Max.-Signal Driving Power (Approx.). . . .	0	0	0	0	watts
Max.-Signal Power Output (Approx.) . . .	36	46	56	72	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance:○○

With fixed bias.	0.1 max. megohm
With cathode bias.	Not recommended

AF POWER AMPLIFIER & MODULATOR - Class AB_2#

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	300 max.	300 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*.	120 max.	120 max.	ma
MAX.-SIGNAL PLATE INPUT* . . .	60 max.	90 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT* .	3.5 max.	3.5 max.	watts
PLATE DISSIPATION*	25 max.	30 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts

Subscript 2 indicates that the grid-No.1 current flows during some part of the input cycle.

* Averaged over any audio-frequency cycle of sine-wave form.

●, ●●, **, ○○: See next page. ← indicates a change.

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BEAM POWER TUBE

Typical Operation:

	CCS●			ICAS●●	
Values are for 2 tubes					
DC Plate Voltage	400	500	600	750	volts
DC Grid-No.2 Voltage** .	300	300	300	300	volts
DC Grid-No.1 (Control-Grid) Voltage:					
From fixed-bias source	-28	-30	-32	-35	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage. . .	80	86	90	96	volts
Zero-Signal DC Plate Current.	72	60	48	30	ma
Max.-Signal DC Plate Current.	240	240	200	240	ma
Zero-Signal DC Grid-No.2 Current. . .	2	0.9	0.7	0.5	ma
Max.-Signal DC Grid-No.2 Current. . .	20	20	18	20	ma
Effective Load Resistance (Plate to plate) . . .	3700	4600	6900	7300	ohms
Max.-Signal Driving Power (Approx.)♦♦. . .	0.2	0.2	0.1	0.2	watt
Max.-Signal Power Output (Approx.)▲. . .	55	75	80	120	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance:○○

With fixed bias.	30000 max.	ohms
With cathode bias.	Not recommended	

RF POWER AMPLIFIER-Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE .	300 max.	300 max.	volts
DC PLATE CURRENT	80 max.	90 max.	ma
PLATE INPUT.	37.5 max.	45 max.	watts
GRID-No.2 INPUT.	2.5 max.	2.5 max.	watts

** Preferably obtained from a separate source, or from the plate-voltage supply with a voltage divider.

♦♦ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the class AB_2 stage. The effective resistance per grid-No.1 circuit of the class AB_2 stage should be kept below 500 ohms and the effective impedance should not exceed 700 ohms at the highest response frequency.

▲ With zero-impedance driver and perfect regulation, plate-circuit distortion does not exceed 2%. In practice, the regulation of the plate-voltage, grid-No.2 voltage, and grid-No.1 voltage should not be greater than 5%, 5%, and 3%, respectively.

●,●●,○○: See next page.

→Indicates a change.

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BEAM POWER TUBE

	CCS●	ICAS●●	
PLATE DISSIPATION.	25 max.	30 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts

Typical Operation: ←

DC Plate Voltage	400	500	600	750	volts
DC Grid-No.2 Voltage . .	300	300	300	300	volts
DC Grid-No.1 (Control-Grid) Voltage♦	-40	-40	-40	-40	volts
Peak RF Grid-No.1 Voltage	40	38	36	35	volts
DC Plate Current	75	70	62.5	60	ma
DC Grid-No.2 Current . .	5	4	4	3	ma
DC Grid-No.1 Current (Approx.).	0	0	0	0	ma
Driving Power (Approx.)□	0.4	0.3	0.2	0.2	watt
Power Output (Approx.)	9	11	12.5	15	watts

Maximum Circuit Values (CCS or ICAS): ←

Grid-No.1-Circuit Resistance∞ . . . . . 30000 max. ohms

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	475 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	300 max.	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE.	-200 max.	-200 max.	volts
DC PLATE CURRENT	83 max.	100 max.	ma
DC GRID-No.1 CURRENT	5 max.	5 max.	ma
PLATE INPUT.	40 max.	60 max.	watts
GRID-No.2 INPUT.	2.5 max.	2.5 max.	watts
PLATE DISSIPATION.	16.5 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts

♦ Use of a fixed supply or bypassed cathode resistor is recommended.

□ At crest of audio-frequency cycle with a modulation factor of 1.0.

∞ The type of input coupling network used should not introduce too much resistance in the grid-No.1 circuit. Transformer- or impedance-coupling devices are recommended.

●, ●●: See next page. ←Indicates a change.

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BEAM POWER TUBE

Typical Operation:	CCS●			ICAS●●	
DC Plate Voltage . . .	325	400	475	600	volts
DC Grid-No.2 Voltage▲▲	250	250	250	300	volts
From a series resistor of . . .	12500	25000	28000	37500	ohms
DC Grid-No.1 Voltage††	-75	-75	-85	-85	volts
From a grid-No.1 resistor of . . .	21400	21400	21200	21200	ohms
Peak RF Grid-No.1 Voltage	95	95	108	107	volts
DC Plate Current . . .	80	80	83	100	ma
DC Grid-No.2 Current .	6	6	8	8	ma
DC Grid-No.1 Current (Approx.)	3.5	3.5	4	4	ma
Driving Power (Approx.)	0.3	0.3	0.4	0.4	watt
Power Output (Approx.)	17	22	28	44	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance■. . . . . 30000 max. ohms

RF POWER AMPLIFIER & OSCILLATOR-Class C Telegraphy■
and
RF POWER AMPLIFIER-Class C FM Telephony

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE .	300 max.	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	100 max.	100 max.	ma
DC GRID-No.1 CURRENT	5 max.	5 max.	ma
PLATE INPUT.	60 max.	75 max.	watts
GRID-No.2 INPUT.	3.5 max.	3.5 max.	watts
PLATE DISSIPATION.	25 max.	30 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts

▲▲ Obtained preferably from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor as indicated.

†† Obtained from a grid-No.1 resistor as indicated, or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

■ Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●, ●●, ■: See next page. → Indicates a change.

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BEAM POWER TUBE

Typical Operation:	CCS●			ICAS●●	
DC Plate Voltage . . .	400	500	600	750	volts
DC Grid-No.2 Voltage■■	250	250	250	250	volts
From a series resistor of. . . .	19000	31000	44000	62000	ohms
DC Grid-No.1 Voltage□□	-45	-45	-45	-45	volts
From a grid-No.1 resistor of. . . .	11200	11200	11200	11200	ohms
From a cathode resistor of. . . .	400	400	400	400	ohms
Peak RF Grid-No.1 Voltage.	65	65	65	65	volts
DC Plate Current . . .	100	100	100	100	ma
DC Grid-No.2 Current .	8	8	8	8	ma
DC Grid-No.1 Current (Approx.).	4	4	4	4	ma
Driving Power (Approx.).	0.3	0.3	0.3	0.3	watt
Power Output (Approx.)	25	32	40	54	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance●. . . . . 30000 max. ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.81	0.99	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	-	0.2	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	-	10	14	μμf
Plate to cathode & grid No.3, grid No.2, and heater	-	5.3	8.7	μμf
Plate Current (1).	1,3	24	48	ma
Plate Current (2).	1,4	-	0.5	ma
Grid-No.2 Current.	1,3	-	4	ma
Power Output	1,5	33	-	watts

Note 1: Heater voltage = 6.3 volts.

Note 2: With external shield JETEC No.312.

Note 3: With dc plate voltage of 600 volts, dc grid-No.2 voltage of 300 volts, and dc grid-No.1 voltage of -29 volts.

Note 4: With dc plate voltage of 600 volts, dc grid-No.2 voltage of 300 volts, and dc grid-No.1 voltage of -100 volts.

Note 5: With dc plate voltage of 600 volts, dc grid-No.2 voltage of 200 volts, dc plate current of 100 ma. max., grid-No.1 current of 5 to 7 ma., grid-No.1 resistor of 10000 ohms ± 10%, and a frequency of 15 Mc.

●, ●●, ●, ■, □□: See next page. ← Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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BEAM POWER TUBE

● Continuous Commercial Service.

●● Intermittent Commercial & Amateur Service.

● When grid No.1 is driven positive, the total dc grid-No.1-circuit resistance should not exceed 30000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply.

■ Obtained from a separate source, from the plate-voltage supply with a voltage divider, or through a series resistor as indicated. A series grid-No.2 resistor should be employed only when the 807 is used in a circuit which is not keyed. Grid-No.2 voltage must not exceed 400 volts under key-up conditions.

□ Obtained from fixed supply, by grid-No.1 resistor as indicated, by cathode resistor as indicated, or by combination methods.

Data on Operating Frequencies for the 807 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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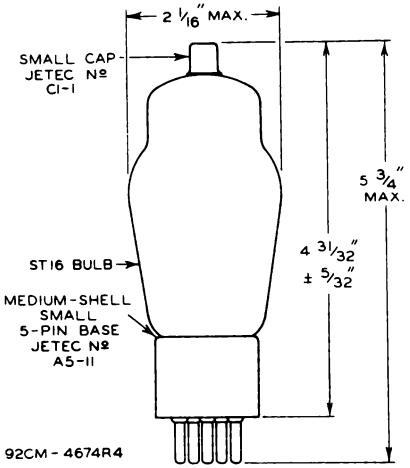
BEAM POWER TUBE



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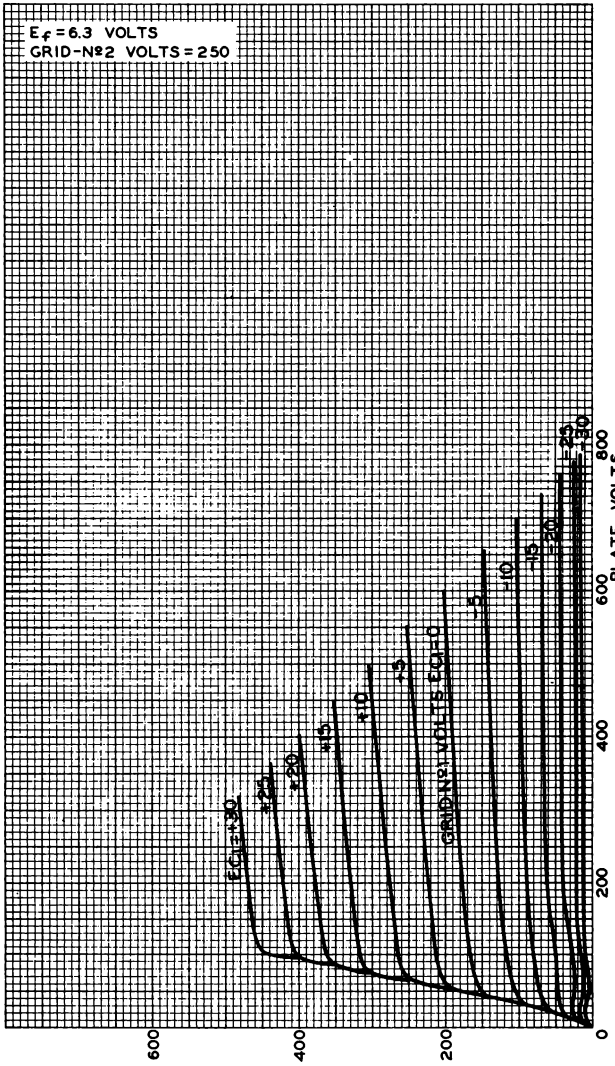
AVERAGE PLATE CHARACTERISTICS



APR. 7, 1953

TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-4676R3

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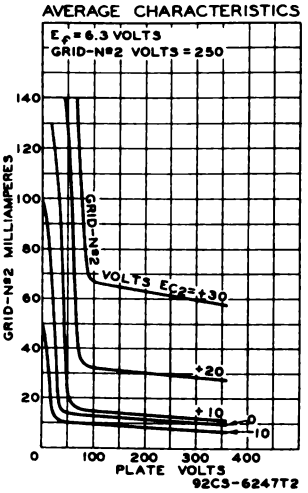
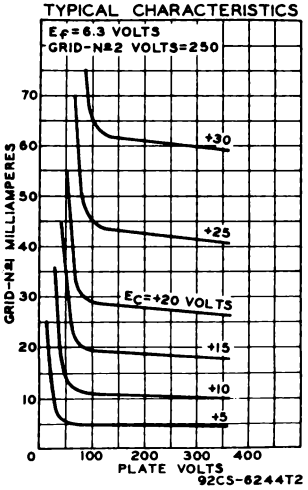
BEAM POWER TUBE





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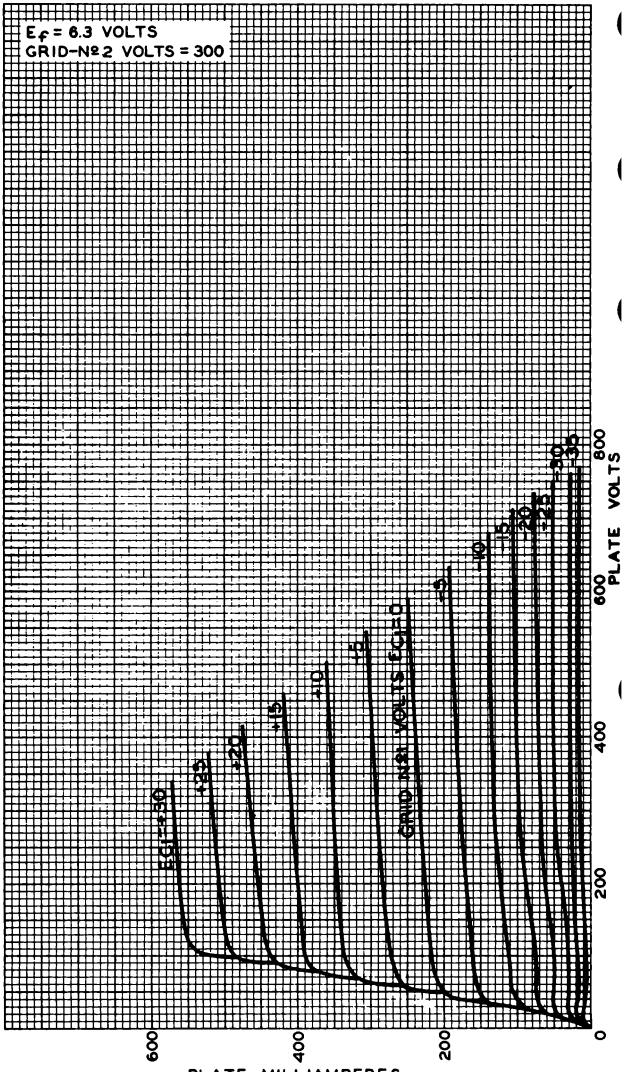
AVERAGE PLATE CHARACTERISTICS



APR. 7, 1953

TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-4682R3

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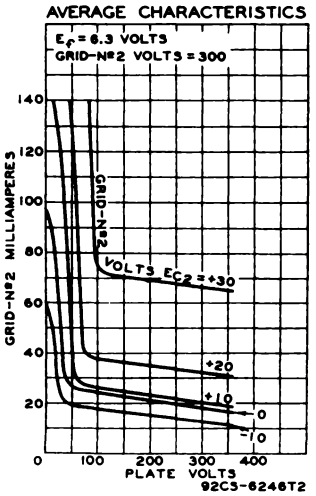
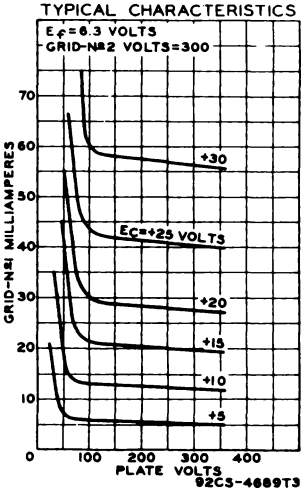
BEAM POWER TUBE





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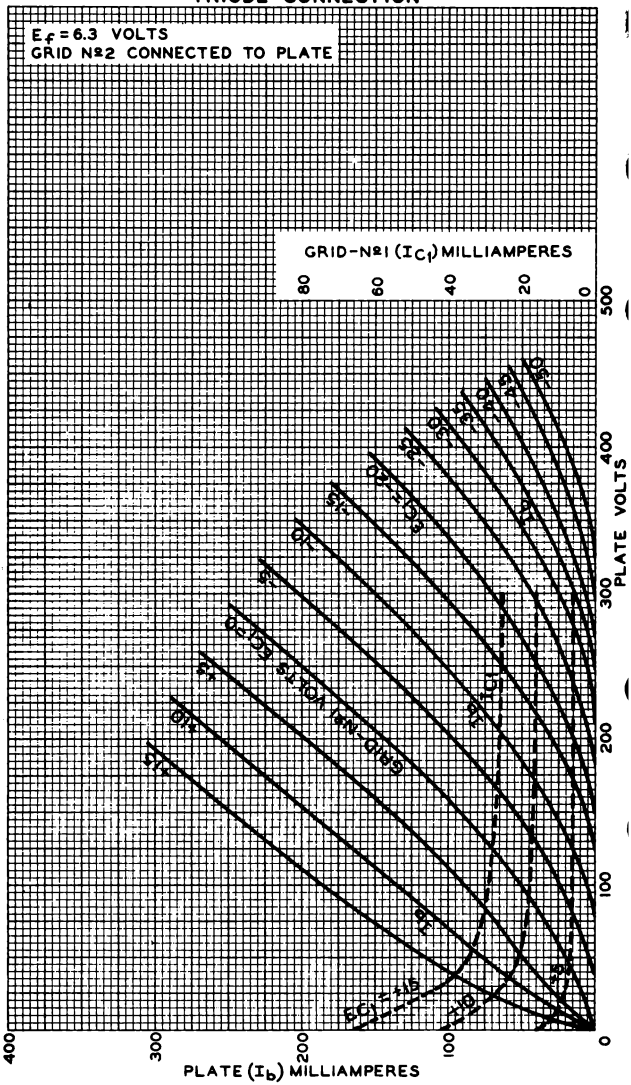
AVERAGE PLATE CHARACTERISTICS
TRIODE CONNECTION



APR. 10, 1953

TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7116R1

808

TRANSMITTING TRIODE

GENERAL DATA

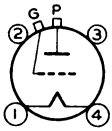
Electrical:

Filament, Thoriated Tungsten:		
Voltage	7.5	ac or dc volts
Current	4.0	amp
Amplification Factor	47	
Direct Interelectrode Capacitances:		
Grid to Plate	2.8	μμf
Grid to Filament	5.3	μμf
Plate to Filament	0.25	μμf ←

Mechanical:

Mounting Position	Vertical only, Base down
Overall Length	5-7/8" ± 3/16"
Seated Length	5-1/4" ± 3/16"
Maximum Diameter	2-13/16"
Bulb	G-22
Cap (top)	Medium
Cap (side)	Small
Base	Medium-Shell Small 4-Pin, Bayonet
Basing Designation for BOTTOM VIEW	$2D_1$

Pin 1 - Filament
Pin 2 - No Connection
Pin 3 - No Connection



Pin 4 - Filament
P - Plate (Top)
G - Grid (Side)

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum Ratings, *Absolute Values:*

	CCS●	ICAS●●	
DC PLATE VOLTAGE	1500 max.	2000 max.	volts ←
MAX.-SIGNAL DC PLATE CUR.*	150 max.	150 max.	ma.
MAX.-SIGNAL PLATE INPUT*	150 max.	225 max.	watts
PLATE DISSIPATION*	50 max.	75 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1250	1500	2000	volts
DC Grid Voltage#	-16.5	-22.5	-36	volts
Peak AF Grid-to-Grid Volt.	245	215	270	volts
Zero-Signal DC Plate Cur.	40	30	40	ma.
Max.-Signal DC Plate Cur.	230	190	220	ma.
Effective Load Resistance (plate-to-plate)	12700	18300	21400	ohms
Max.-Signal Driving Power (Approx.)	7.8	4.8	8.8	watts

← indicates a change.
* Averaged over any audio-frequency cycle of sine-wave form.
●, ●●, #: See next page.

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TRANSMITTING TRIODE

Max.-Signal Power Output (Approx.)	190	185	300 . .	watts

* *For ac filament supply.*

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

(Carrier conditions per tube for use with a max. modulation factor of 1.0)

Maximum Ratings, *Absolute Values:*

	CCS●	ICAS●●	
DC PLATE VOLTAGE.	1250 max.	1600 max.	volts
DC GRID VOLTAGE	-400 max.	-400 max.	volts
DC PLATE CURRENT.	125 max.	125 max.	ma.
DC GRID CURRENT	35 max.	40 max.	ma.
PLATE INPUT	135 max.	200 max.	watts
PLATE DISSIPATION	35 max.	50 max.	watts

Typical Operation:

DC Plate Voltage.	1000	1250	1600 . .	volts
DC Grid Voltage⊕.	-135	-150	-170 . .	volts
	3900	5000	4600 . .	ohms
Peak RF Grid Voltage. . .	270	270	300 . .	volts
DC Plate Current.	120	100	125 . .	ma.
DC Grid Current (Approx.)□	35	30	37 . .	ma.
Driving Power (Approx.)□.	9	7.5	10 . .	watts
Power Output (Approx.). .	90	95	150 . .	watts

⊕ Obtained by grid resistor of value shown or by partial self-bias methods.

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum Ratings, *Absolute Values:*

	CCS●	ICAS●●	
DC PLATE VOLTAGE.	1500 max.	2000 max.	volts
DC GRID VOLTAGE	-400 max.	-400 max.	volts
DC PLATE CURRENT.	150 max.	150 max.	ma.
DC GRID CURRENT	35 max.	40 max.	ma.
PLATE INPUT	200 max.	300 max.	watts
PLATE DISSIPATION	50 max.	75 max.	watts

Typical Operation:

DC Plate Voltage.	1250	1500	2000 . .	volts
DC Grid Voltage Δ	-150	-150	-150 . .	volts
	4300	4300	4200 . .	ohms
	880	940	800 . .	ohms
Peak RF Grid Voltage. . .	290	300	280 . .	volts
DC Plate Current.	135	125	150 . .	ma.
DC Grid Current (Approx.)□	35	35	36 . .	ma.
Driving Power (Approx.)□	9	9.5	9 . .	watts
Power Output (Approx.). .	125	140	225 . .	watts

← Indicates a change.

●, ●●, □, □□, Δ: See next page.

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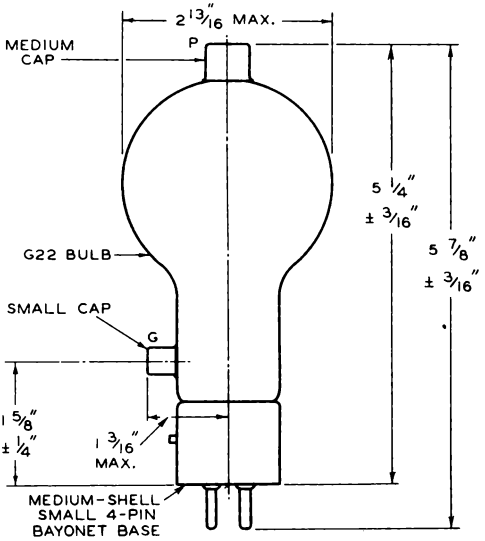
TRANSMITTING TRIODE

- ● Continuous Commercial Service.
- ●● Intermittent Commercial and Amateur Service.
- □ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.
- □□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.
- Δ Obtained from fixed supply, by grid resistor (4300, 4300, 4200) or by cathode resistor (880, 940, 800).

NOTE: When the 808 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed-bias must be used to maintain plate current at a safe value. With a plate voltage of 2000 volts, a fixed bias of at least -30 volts should be used.

Data on operating frequencies for the 808 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY



THE PLANE THROUGH THE TUBE AXIS AND CENTER OF GRID CAP MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND CENTER OF BAYONET PIN BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°.

92CM-4677R3

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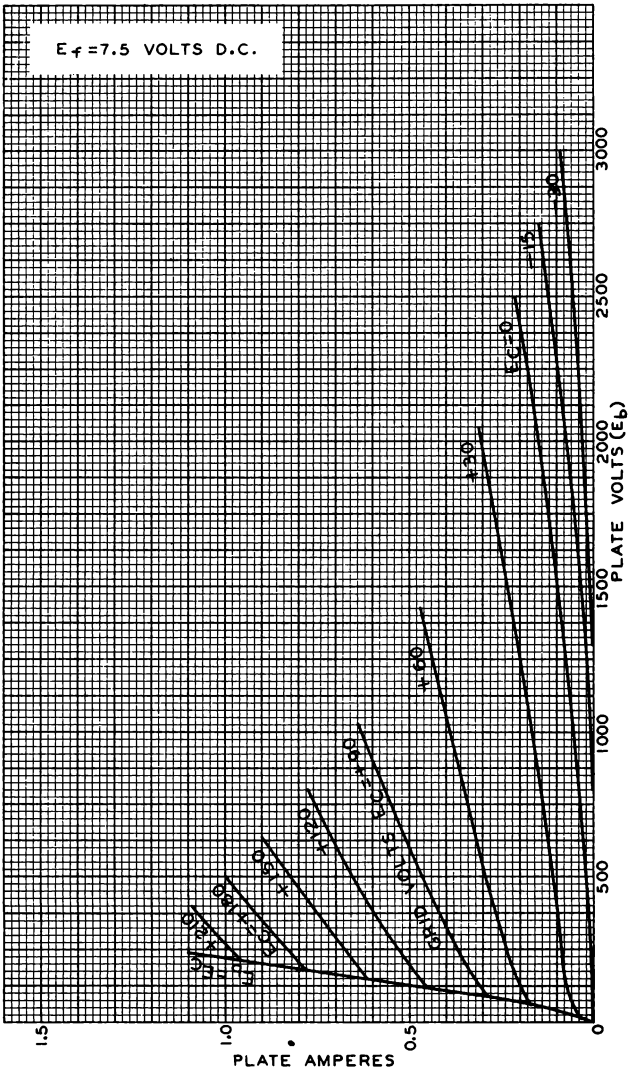
AVERAGE PLATE CHARACTERISTICS



OCT. 26, 1936

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-4678

808

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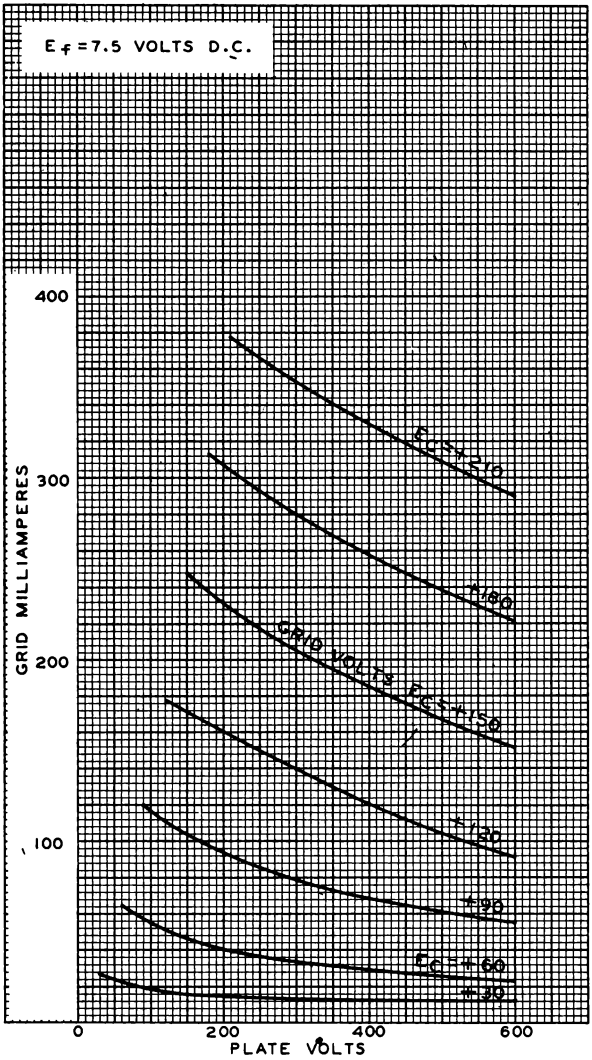
TYPICAL CHARACTERISTICS



809
TRANSMITTING TRIODE

GENERAL DATA

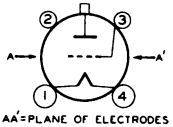
Electrical:

Filament, Thoriated Tungsten:		
Voltage	6.3	ac or dc volts
Current	2.5	amp
Amplification Factor	50	
Direct Interelectrode Capacitances:		
Grid to Plate	6.7	μμf
Grid to Filament	5.7	μμf
Plate to Filament	0.9	μμf

Mechanical:

Mounting Position	Vertical, base down; or Horizontal, pins 1 & 4 in vertical plane
Overall Length	6-13/32" ± 5/32"
Seated Length	5-25/32" ± 5/32"
Maximum Diameter	2-7/16"
Bulb	ST-19
Cap	Medium
Base	Medium-Shell Small 4-Pin Micanol, Bayonet
Basing Designation for BOTTOM VIEW	3G

Pin 1 - Filament
Pin 2 - No Connection



AA'=PLANE OF ELECTRODES

Pin 3 - Grid
Pin 4 - Filament
Cap - Plate

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	750 max.	1000 max.	volts
MAX.-SIGNAL DC PLATE CUR.*	125 max.	125 max.	ma. ←
MAX.-SIGNAL PLATE INPUT*	75 max.	100 max.	watts
PLATE DISSIPATION*	25 max.	30 max.	watts

Typical Operation: ←

Unless otherwise specified, values are for 2 tubes

DC Plate Voltage	750		700	1000	volts
DC Grid Voltage#	-4.5		0	-9	volts
Peak AF Grid-to-Grid Voltage	145		160	155	volts
Zero-Signal DC Plate Current	40		70	40	ma.
Max.-Signal DC Plate Current	200		250	200	ma.
Effective Load Resistance (plate-to-plate)	8400		6200	11600	ohms

*, ●, ●●, #: See next page. ← Indicates a change.

809
TRANSMITTING TRIODE

Max.-Signal Driving Power (Approx.) . . .	2.5	. .	3.4	2.7	watts
Max.-Signal Power Output (Approx.) . . .	105	. .	120	145	watts

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

	CCS●		*ICAS*●●	
DC PLATE VOLTAGE	750 max.		1000 max.	volts
DC PLATE CURRENT	50 max.		60 max.	ma.
PLATE INPUT.	37.5 max.		45 max.	watts
PLATE DISSIPATION.	25 max.		30 max.	watts

Typical Operation:

DC Plate Voltage	500	750	1000	. .	volts
DC Grid Voltage#	-5	-10	-30	. .	volts
Peak RF Grid Voltage . .	35	40	60	. .	volts
DC Plate Current	50	50	45	. .	ma.
DC Grid Current (Approx.)□	6	5	4	. .	ma.
Driving Power (Approx.)□▲	1.4	1.4	1.5	. .	watts
Power Output (Approx.) .	7.5	12.5	15	. .	watts

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

	CCS●		*ICAS*●●	
DC PLATE VOLTAGE	600 max.		750 max.	volts
DC GRID VOLTAGE.	-200 max.		-200 max.	volts
DC PLATE CURRENT	83 max.		100 max.	ma.
DC GRID CURRENT.	35 max.		35 max.	ma.
PLATE INPUT.	50 max.		75 max.	watts
PLATE DISSIPATION.	17.5 max.		25 max.	watts

Typical Operation:

DC Plate Voltage	500	600	750	. .	volts
DC Grid Voltage⊕	-60	-60	-60	. .	volts
	2000	2000	2000	. .	ohms
Peak RF Grid Voltage . .	135	135	150	. .	volts
DC Plate Current	83	83	100	. .	ma.
DC Grid Current (Approx.)□	32	32	32	. .	ma.
Driving Power (Approx.)□	3.2	3.2	4.3	. .	watts
Power Output (Approx.) .	30	38	55	. .	watts

* Averaged over any audio-frequency cycle of sine-wave form.
\# For ac filament supply.
⊕ obtained by grid resistor of value shown or by partial self-bias methods.
●, ●●, □, ▲: See next page.

809
TRANSMITTING TRIODE

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum Ratings, *Absolute Values*:

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE.	750 max.	1000 max.	volts
DC GRID VOLTAGE	–200 max.	–200 max.	volts
DC PLATE CURRENT.	100 max.	100 max.	ma.
DC GRID CURRENT	35 max.	35 max.	ma.
PLATE INPUT	75 max.	100 max.	watts
PLATE DISSIPATION	25 max.	30 max.	watts

Typical Operation:

DC Plate Voltage.	500	750	1000	. .	volts
DC Grid Voltage▲▲	–50	–60	–75	. .	volts
	2500	3000	3000	. .	ohms
	420	500	600	. .	ohms
Peak RF Grid Voltage. . .	135	140	160	. .	volts
DC Plate Current.	100	100	100	. .	ma.
DC Grid Current(Approx.)□	20	20	25	. .	ma.
Driving Power (Approx.)□	2.5	2.5	3.8	. .	watts
Power Output (Approx.). .	35	55	75	. .	watts

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

□ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

▲ At crest of audio-frequency cycle of sine-wave form.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

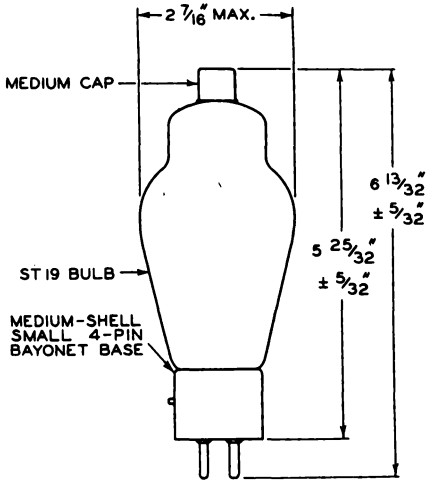
▲▲ Obtained from fixed supply, by grid resistor (2500, 3000, 3000) or by cathode resistor (420,500,600).

NOTE: When the 809 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed-bias must be used to maintain the plate current at a safe value. With a plate voltage of 1000 volts, a fixed bias of at least -10 volts should be used.

Data on operating frequencies for the 809 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

809

809
TRANSMITTING TRIODE



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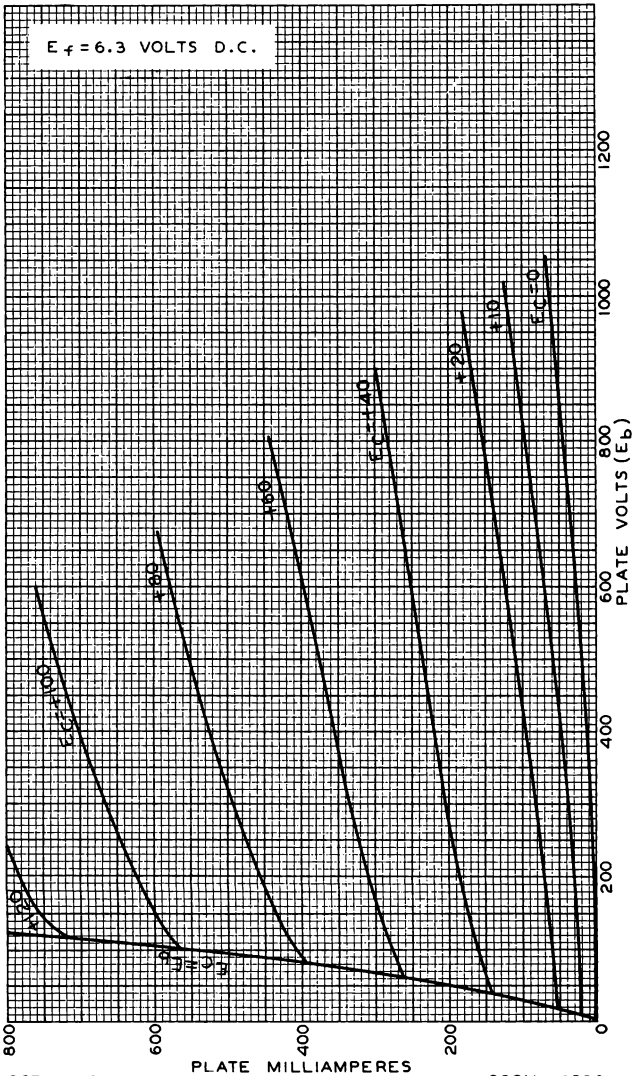
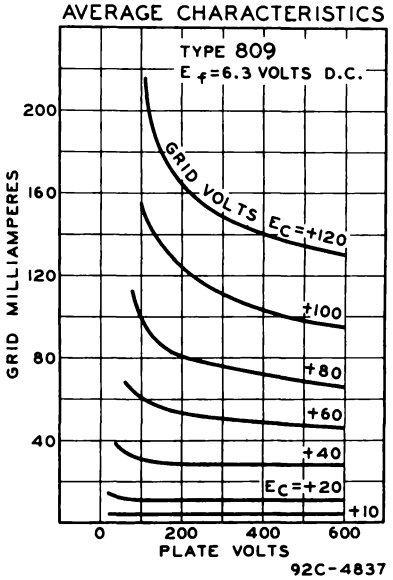
AVERAGE PLATE CHARACTERISTICS



809
TRANSMITTING TRIODE



810
TRANSMITTING TRIODE

GENERAL DATA

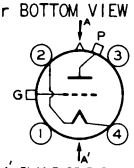
Electrical:

Filament, Thoriated Tungsten:		
Voltage	10	ac or dc volts
Current	4.5	amp
Amplification Factor	36	
Direct Interelectrode Capacitances:		
Grid to Plate	4.8	μμf
Grid to Filament	8.7	μμf
Plate to Filament	12	μμf

Mechanical:

Mounting Position	Vertical, base down; or Horizontal, pins 1 & 2 in vertical plane
Overall Length	8-1/2" ± 1/4"
Seated Length	8-3/16" ± 1/4"
Maximum Radius	2-1/8" ± 1/8"
Bulb	T-20
Cap (top)	Skirted Medium
Cap (side)	Medium
Base	Medium Metal-Shell Jumbo 4-Pin. Bayonet
Basing Designation for BOTTOM VIEW	20_1

Pin 1 - No Connection
Pin 2 - Filament
Pin 3 - No Connection



Pin 4 - Filament
P - Plate (End Cap)
G - Grid (Side Cap)

AA'=PLANE OF ELECTRODES

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum Ratings, *Absolute Values:*

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	2500 max.	2750 max.	volts
MAX.-SIGNAL DC PLATE CUR.*	250 max.	250 max.	ma.
MAX.-SIGNAL PLATE INPUT*	425 max.	510 max.	watts
PLATE DISSIPATION*	125 max.	175 max.	watts ←

Typical Operation:

Unless otherwise specified, values are for 2 tubes

DC Plate Voltage	2000	2250	volts
DC Grid Voltage#	-50	-60	volts
Peak AF Grid-to-Grid Voltage	345	380	volts
Zero-Signal DC Plate Current	60	70	ma.
Max.-Signal DC Plate Current	420	450	ma.
Effective Load Resistance (plate to plate)	11000	11600	ohms

* Averaged over any audio-frequency cycle of sine-wave form.
●, ●●, #: See next page. ← indicates a change.

810
TRANSMITTING TRIODE

Max.-Signal Driving Power (Approx.) . .	10 . .	13 . .	watts
Max.-Signal Power Output (Approx.) . .	590 . .	725 . .	watts

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●		ICAS●●	
→ DC PLATE VOLTAGE	2000 max.		2500 max.	volts
DC PLATE CURRENT	185 max.		185 max.	ma.
PLATE INPUT.	185 max.		225 max.	watts
→ PLATE DISSIPATION.	125 max.		175 max.	watts

Typical Operation:

DC Plate Voltage	1500	2000	2250 . .	volts
DC Grid Voltage#	-50	-65	-70 . .	volts
Peak RF Grid Voltage . . .	110	100	100 . .	volts
DC Plate Current	115	93	100 . .	ma.
DC Grid Current (Approx.)□	2	2	2 . .	ma.
Driving Power (Approx.)□▲	6	4	4 . .	watts
Power Output (Approx.) . .	60	60	75 . .	watts

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
→ DC PLATE VOLTAGE	1600 max.	2000 max.	volts
DC GRID VOLTAGE.	-500 max.	-500 max.	volts
DC PLATE CURRENT	210 max.	250 max.	ma.
→ DC GRID CURRENT.	70 max.	75 max.	ma.
→ PLATE INPUT.	335 max.	500 max.	watts
PLATE DISSIPATION.	85 max.	125 max.	watts

→ **Typical Operation:**

DC Plate Voltage	1250	1600	2000 . .	volts
DC Grid Voltage⊕	-200	-200	-350 . .	volts
	4000	4000	5000 . .	ohms
Peak RF Grid Voltage . . .	370	370	550 . .	volts
DC Plate Current	210	210	250 . .	ma.
DC Grid Current (Approx.)□	50	50	70 . .	ma.
Driving Power (Approx.)□ .	17	17	35 . .	watts
Power Output (Approx.) . .	180	250	380 . .	watts

For ac filament supply.

⊕ Obtained by grid resistor of value shown or by partial self-bias methods.

●, ●●, □, ▲: See next page. ← Indicates a change.

810
TRANSMITTING TRIODE

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation □□

Maximum Ratings, *Absolute Values:* ←

	CCS●	ICAS●●	
DC PLATE VOLTAGE	2000 max.	2500 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT	250 max.	300 max.	ma.
DC GRID CURRENT	70 max.	75 max.	ma.
PLATE INPUT	500 max.	750 max.	watts
PLATE DISSIPATION	125 max.	175 max.	watts

Typical Operation: ←

DC Plate Voltage	1500	2000	2500	. .	volts
DC Grid Voltage▲▲	-120	-160	-180	. .	volts
	3000	4000	3000	. .	ohms
	415	550	500	. .	ohms
Peak RF Grid Voltage	280	330	350	. .	volts
DC Plate Current	250	250	300	. .	ma.
DC Grid Current (Approx.)□	40	40	60	. .	ma.
Driving Power (Approx.)□	10	12	19	. .	watts
Power Output (Approx.)	275	375	575	. .	watts

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

□ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

▲ At crest of audio-frequency cycle with modulation factor of 1.0.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

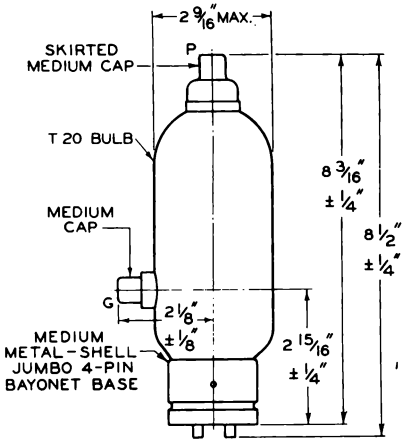
▲▲ Obtained from fixed supply, by grid resistor (3000, 4000, 3000), or by cathode resistor (415, 550, 500).

NOTE: When the 810 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed-bias must be used to maintain the plate current at a safe value. With a plate voltage of 2500 volts, a fixed bias of at least -40 volts should be used.

Data on operating frequencies for the 810 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

← Indicates a change.

810
TRANSMITTING TRIODE



92CM-4965R1

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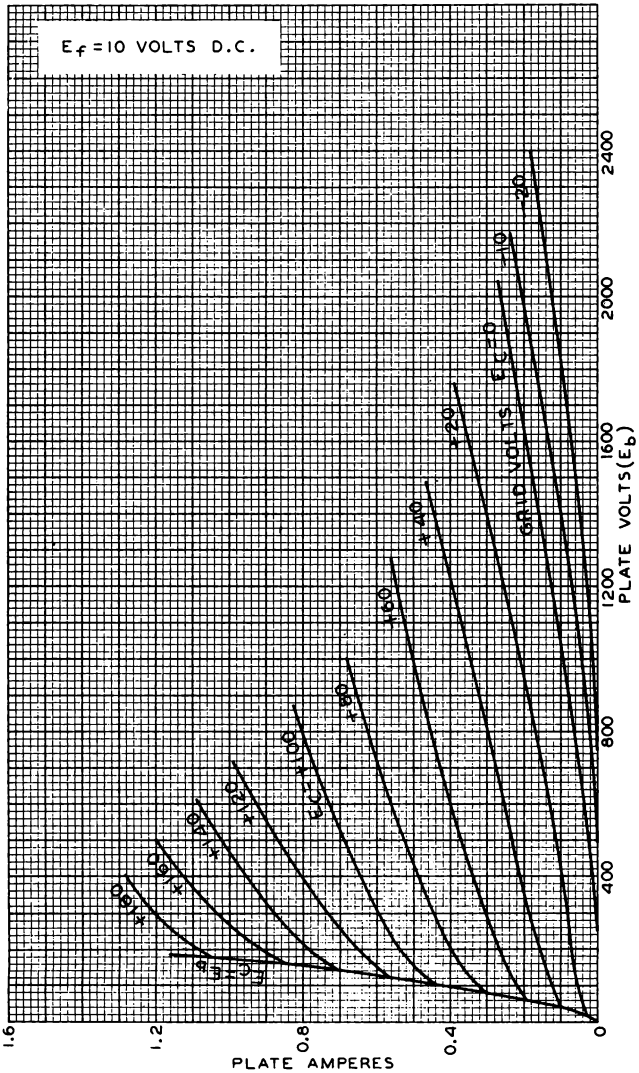
AVERAGE PLATE CHARACTERISTICS



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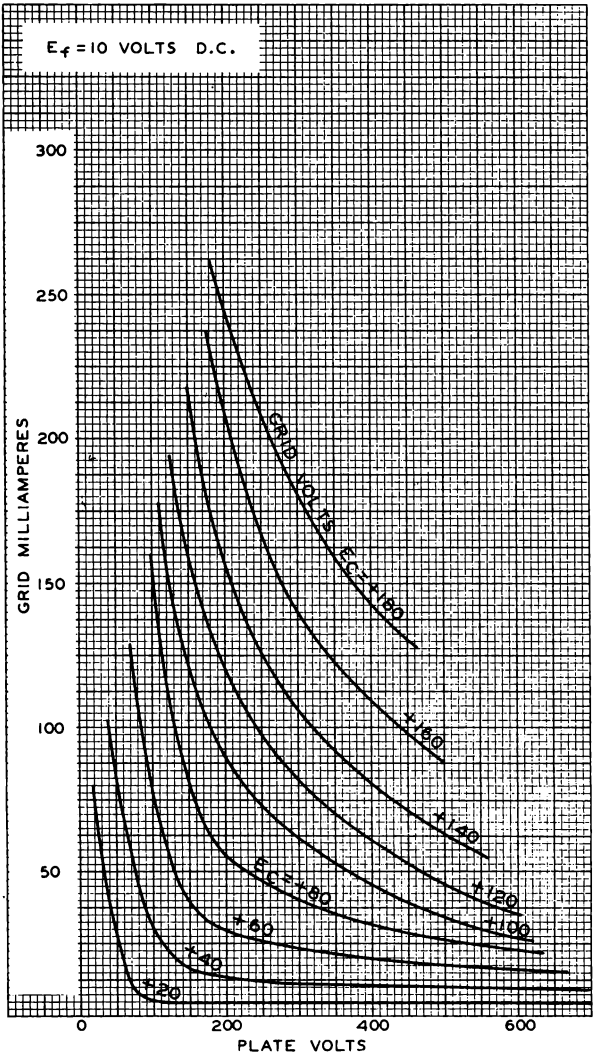
TYPICAL CHARACTERISTICS



811-A

POWER TRIODE

Supersedes Type 811

GENERAL DATA

Electrical:

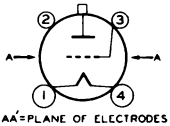
Filament, Thoriated Tungsten:

Voltage	6.3	ac or dc volts
Current	4	amp
Amplification Factor	160	
Direct Interelectrode Capacitances:		
Grid to Plate	5.6	μμf
Grid to Filament	5.9	μμf
Plate to Filament	0.7	μμf

Mechanical:

Mounting Position	Vertical, base down; or Horizontal, pins 1 & 4 in vertical plane
Overall Length	6-1/2" ± 5/32"
Seated Length	5-7/8" ± 5/32"
Maximum Diameter	2-7/16"
Bulb	ST-19
Cap	Medium
Base	Medium-Shell Small 4-Pin Micanol, Bayonet
Basing Designation for BOTTOM VIEW	3G

Pin 1 - Filament
Pin 2 - No Connection



AA'=PLANE OF ELECTRODES

Pin 3 - Grid
Pin 4 - Filament
Cap - Plate

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum Ratings, ***Absolute Values:***

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
MAX.-SIGNAL DC PLATE CUR.*	175 max.	175 max.	ma
MAX.-SIGNAL PLATE INPUT	165 max.	235 max.	watts
PLATE DISSIPATION*	45 max.	65 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	750	1250	1000	1250	1500	volts
DC Grid Voltage#	0	0	0	0	-4.5	volts
Peak AF Grid-to-Grid Volt.	197	145	185	175	170	volts
Zero-Signal DC Plate Cur.	32	50	44	54	32	ma
Max.-Signal DC Plate Cur.	350	260	350	350	313	ma

\# For ac filament supply.

* Averaged over any audio-frequency cycle of sine-wave form.

●, ●●: See next page.

811-A

811-A

POWER TRIODE

	CCS●		ICAS●●			
Effective Load Resistance (Plate to plate). .	5100	12400	7400	9200	12400	ohms
Max.-Signal Driving Power (Approx.) . .	9.7	3.8	7.5	6.0	4.4	watts
Max.-Signal Power Output (Approx.). .	178	235	248	310	340	watts

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE.	1000 max.	1250 max.	volts
DC GRID VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT.	125 max.	150 max.	ma
DC GRID CURRENT	50 max.	50 max.	ma
PLATE INPUT	115 max.	175 max.	watts
PLATE DISSIPATION	30 max.	45 max.	watts

Typical Operation:

DC Plate Voltage.	1000	1250	volts
DC Grid Voltage⊕.	-55	-120	volts
	1200	2700	ohms
Peak RF Grid Voltage. . .	150	250	volts
DC Plate Current.	115	140	ma
DC Grid Current (Approx.)□	45	45	ma
Driving Power (Approx.)□	6.1	10	watts
Power Output (Approx.). .	88	135	watts

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE.	1250 max.	1500 max.	volts
DC GRID VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT.	175 max.	175 max.	ma
DC GRID CURRENT	50 max.	50 max.	ma
PLATE INPUT	175 max.	260 max.	watts
PLATE DISSIPATION	45 max.	65 max.	watts

Typical Operation:

DC Plate Voltage.	1250	1500	volts

●● Intermittent Commercial and Amateur Service.

⊕ Obtained by grid resistor of value shown or by partial self-bias methods.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●,□: See next page.

811-A

POWER TRIODE

	CCS●	ICAS●●	
DC Grid Voltage▲▲	-50	-70	volts
	1100	1750	ohms
	270	330	ohms
Peak RF Grid Voltage	140	175	volts
DC Plate Current	140	173	ma
DC Grid Current (Approx.)□	45	40	ma
Driving Power (Approx.)□	5.7	7.1	watts
Power Output (Approx.)	135	200	watts

SELF-RECTIFYING AMPLIFIER▲—Class C

Maximum CCS● Ratings, ***Absolute Values:***

AC PLATE VOLTAGE (RMS)	1750 max.	volts
DC GRID VOLTAGE	-125 max.	volts
DC PLATE CURRENT	65 max.	ma
DC GRID CURRENT	25 max.	ma
PLATE INPUT	125 max.	watts
PLATE DISSIPATION	45 max.	watts

Typical Operation in Push-Pull Circuit at 27 Mc:

Values are for 2 tubes

AC Plate Voltage (RMS)	1750	volts
DC Grid Voltage† ⊕	-70	volts
	1500	ohms
DC Plate Current	130	ma
DC Grid Current (Approx.)	46	ma
Driving Power (Approx.)■	12	watts
Power Output (Approx.)	175	watts
Useful Power Output (Approx.)— 75% circuit efficiency	130	watts

AMPLIFIER▲—Class C

With Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	1125 max.	volts
DC GRID VOLTAGE	-125 max.	volts
DC PLATE CURRENT	160 max.	ma

● Continuous Commercial Service.

□ For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—*Grid Current and Driving Power* in the General Section.

▲▲ Obtained from fixed supply, by grid resistor (1100, 1750) or by cathode resistor (270, 330).

▲ The 811-A is not recommended for oscillator service in applications involving wide variations in load. For such applications, the 812-A with its low amplification factor is preferred because of its ability to oscillate over a wide range of load variation.

□ From a self-rectifying driver.

†, ⊕: See next page.

811-A

POWER TRIODE

DC GRID CURRENT	45 max.	ma
PLATE INPUT	175 max.	watts
PLATE DISSIPATION	45 max.	watts

Typical Operation:

DC Plate Voltage	1125	volts
DC Grid Voltage† ⊕	−35	volts
	1400	ohms
DC Plate Current	125	ma
DC Grid Current (Approx.)	25	ma
Driving Power (Approx.)■■	3	watts
Power Output (Approx.)	135	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	3.75	4.25	amp
Amplification Factor	1,2	144	176	
Grid-Plate Capacitance	–	4.9	6.3	μμf
Grid-Filament Capacitance	–	4.9	6.9	μμf
Plate-Filament Capacitance	–	0.52	0.88	μμf
Plate Current	1,3	16	36	ma
Grid Current	1,4	25	85	ma
Useful Power Output	1,5	140	–	watts

NOTE 1: With dc filament voltage of 6.3 volts.

NOTE 2: With dc plate current of 20 ma. and dc grid voltage of −1 volt.

NOTE 3: With dc plate voltage of 2000 volts and dc grid voltage of −2 volts.

NOTE 4: With dc plate voltage of 200 volts and dc grid voltage of +50 volts.

NOTE 5: With dc plate voltage of 1500 volts; dc plate current of 175 ma; dc grid current of 34 to 50 ma; grid resistor of 3500 ± 10% ohms; and frequency of 15 Mc.

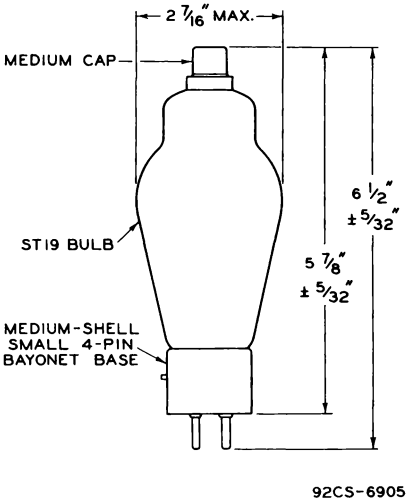
† The 811-A can be biased by any convenient method. However, the use of a grid resistor is preferred because the bias is automatically adjusted as the load on the circuit varies. In those applications, such as are encountered in therapeutic equipment, where grid current and grid voltage may vary widely because of fluctuating loads, it is important to design equipment so that the maximum grid-current and grid-voltage ratings are never exceeded for any load.

■■ From a driver with a rectified, unfiltered, single-phase, full-wave plate supply.

⊕ Obtained by grid resistor of value shown or by partial self-bias methods.

Data on operating frequencies for the 811-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

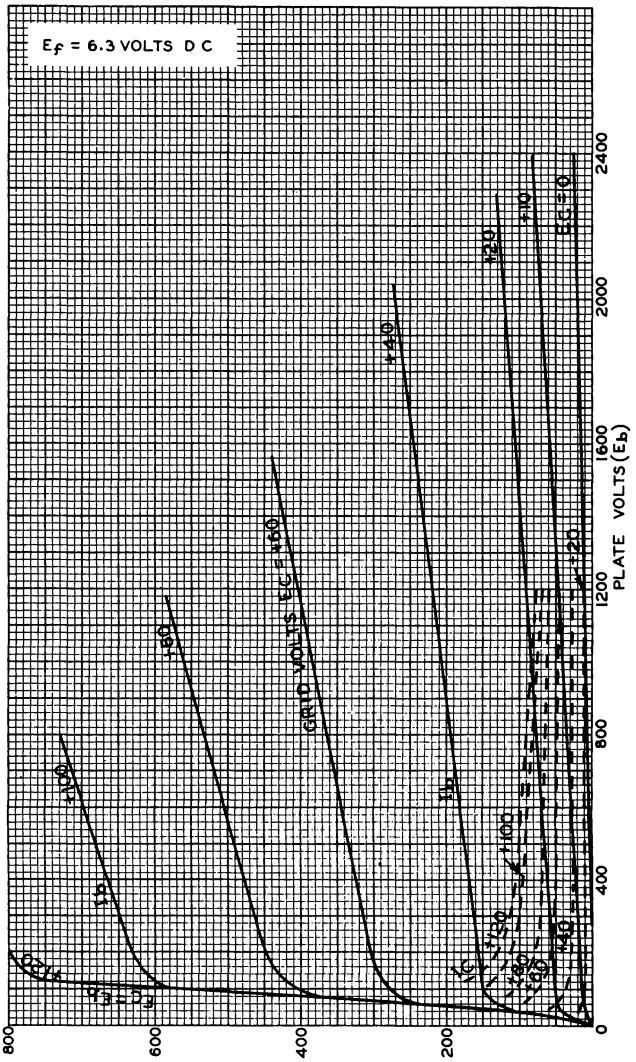
811-A
POWER TRIODE



811-A

811-A

AVERAGE PLATE CHARACTERISTICS



MAR. 31, 1949 TUBE DEPARTMENT 92CM-6075

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

811-A

OPERATION CHARACTERISTICS

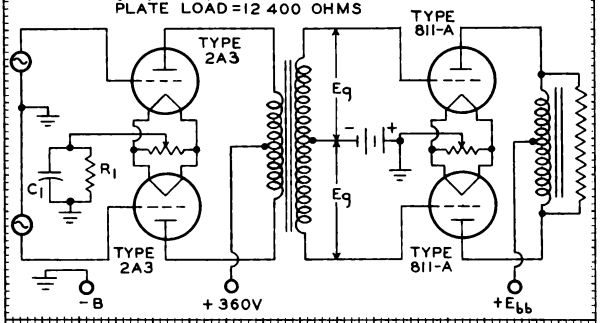
E_f = 6.3 VOLTS AC FOR 811-A's & 2.5 VOLTS AC FOR 2A3's

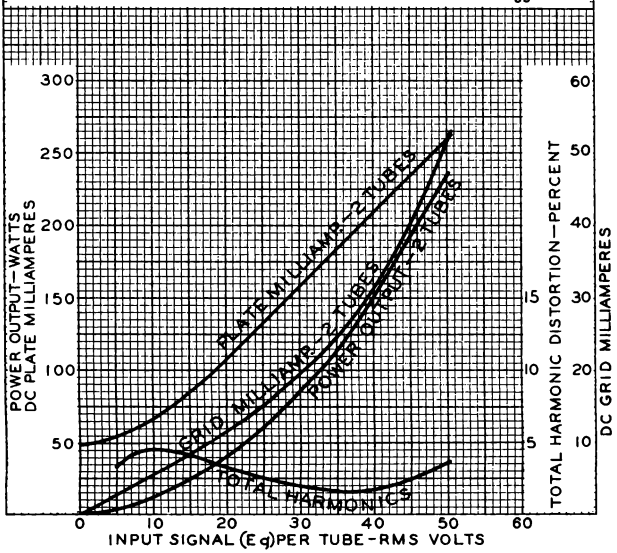
INPUT: CLASS AB_1-TWO TYPE 2A3's; PLATE-SUPPLY VOLTS = 360; CATHODE-BIAS RESISTOR (R_1) = 780 OHMS; BYPASS CAPACITOR (C_1) = 80 μf

INTERSTAGE TRANSFORMER (T):

VOLTAGE RATIO $\frac{\text{PRIMARY}}{1/2\ \text{SEC.}} = 6$

OUTPUT: CLASS B-TWO TYPE 811-A's; PLATE-SUPPLY VOLTS (E_{bb}) = 1250; DC GRID VOLTS = 0; PLATE-TO-PLATE LOAD = 12 400 OHMS



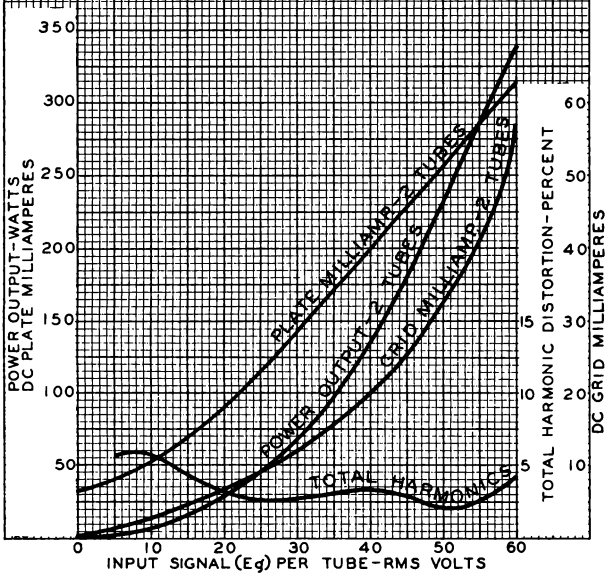


811-A

811-A

OPERATION CHARACTERISTICS

E_f = 6.3 VOLTS AC FOR 811-A's & 2.5 VOLTS AC FOR 2A3's
CIRCUIT ARRANGEMENT: SAME AS ON DWG. 92CM-7138 UNDER TYPE 811-A
INPUT: CLASS AB_1 - TWO TYPE 2A3's; PLATE - SUPPLY VOLTS = 360; CATHODE - BIAS RESISTOR (R_1) = 780 OHMS; BYPASS CAPACITOR (C_1) = 80 μf
INTERSTAGE TRANSFORMER (T):
VOLTAGE RATIO $\frac{\text{PRIMARY}}{\frac{1}{2}\text{ SEC.}} = 6$
OUTPUT: CLASS B - TWO TYPE 811-A's; PLATE-SUPPLY VOLTS (E_{bb}) = 1500; DC GRID VOLTS = -4.5; PLATE-TO-PLATE LOAD = 12400 OHMS



812-A
POWER TRIODE

Supersedes Type 812

GENERAL DATA

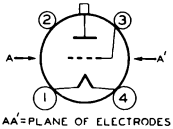
Electrical:

Filament, Thoriated Tungsten:		
Voltage (AC or DC)	6.3 ± 0.3	volts
Current, with 6.3 volts on filament	4	amp
Amplification Factor	29	
Direct Interelectrode Capacitances:		
Grid to Plate	5.5	μμf
Grid to Filament	5.4	μμf
Plate to Filament	0.77	μμf

Mechanical:

Mounting Position	Vertical, base down; or Horizontal, with pins 1 and 4 in vertical plane
Overall Length	6-1/2" ± 5/32"
Seated Length	5-7/8" ± 5/32"
Maximum Diameter	2-7/16"
Bulb	ST-19
Cap	Medium, with Insulating Collar
Base	Medium-Shell Small 4-Pin Micanol, Bayonet
Basing Designation for BOTTOM VIEW	3G

Pin 1 - Filament
Pin 2 - No Connection



AA'=PLANE OF ELECTRODES

Pin 3 - Grid
Pin 4 - Filament
Cap - Plate

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum Ratings, ***Absolute Values:***

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	175 max.	175 max.	ma
MAX.-SIGNAL PLATE INPUT*	165 max.	235 max.	watts
PLATE DISSIPATION*	45 max.	65 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1250	1500	volts
DC Grid Voltage#	-40	-48	volts
Peak AF Grid-to-Grid Voltage	225	270	volts
Zero-Signal DC Plate Current	22	28	ma
Max.-Signal DC Plate Current	260	310	ma
Effective Load Resistance (plate-to-plate)	12200	13200	ohms
Max.-Signal Driving Power (Approx.)	3.5	5	watts
Max.-Signal Power Output (Approx.)	235	340	watts

* Averaged over any audio-frequency cycle of sine-wave form.
●, ●●, #: See next page.

812-A

812-A
POWER TRIODE

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

	CCS●	ICAS●●	
DC PLATE VOLTAGE	1000 max.	1250 max.	volts
DC GRID VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	125 max.	150 max.	ma
DC GRID CURRENT	35 max.	35 max.	ma
PLATE INPUT	115 max.	175 max.	watts
PLATE DISSIPATION	30 max.	45 max.	watts

Typical Operation:

DC PLATE VOLTAGE	1000	1250	volts
DC Grid Voltage●	-110	-115	volts
	3400	3300	ohms
Peak RF Grid Voltage	220	240	volts
DC Plate Current	115	140	ma
DC Grid Current (Approx.)	33	35	ma
Driving Power (Approx.)	6.6	7.6	watts
Power Output (Approx.)	85	130	watts

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum Ratings, *Absolute Values:*

	CCS●	ICAS●●	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
DC GRID VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	175 max.	175 max.	ma
DC GRID CURRENT	35 max.	35 max.	ma
PLATE INPUT	175 max.	260 max.	watts
PLATE DISSIPATION	45 max.	65 max.	watts

Typical Operation:

DC Plate Voltage	1250	1500	volts
DC Grid Voltage▲▲	-90	-120	volts
	3000	4000	ohms
	530	590	ohms
Peak RF Grid Voltage	200	240	volts
DC Plate Current	140	173	ma
DC Grid Current (Approx.)	30	30	ma
Driving Power (Approx.)	5.4	6.5	watts
Power Output (Approx.)	130	190	watts

●, ●●, #, ⊕, ▲▲, □□: See next page.

812-A
POWER TRIODE

SELF-RECTIFYING OSCILLATOR or AMPLIFIER - Class C

Maximum Ratings, ***Absolute Values:***

	CCS●	
AC PLATE VOLTAGE (RMS)	1750 max.	volts
DC GRID VOLTAGE	-125 max.	volts
DC PLATE CURRENT	75 max.	ma
DC GRID CURRENT	20 max.	ma
PLATE INPUT	145 max.	watts
PLATE DISSIPATION	45 max.	watts

Typical Operation in Push-Pull Circuit at 27 Mc.:

Values are for 2 tubes

AC Plate Voltage (RMS)	1740	volts
Grid Resistor⊕	3500	ohms
DC Plate Current	150	ma
DC Grid Current (at full load)	29	ma
Driving Power (Approx.)▲	12	watts
Power Output (Approx.)	200	watts
Useful Power Output (Approx.)- 75% circuit efficiency	150	watts

AMPLIFIER or OSCILLATOR - Class C

With Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply

Maximum Ratings, ***Absolute Values:***

	CCS●	
DC PLATE VOLTAGE	1125 max.	volts
DC GRID VOLTAGE	-125 max.	volts
DC PLATE CURRENT	160 max.	ma
DC GRID CURRENT	32 max.	ma
PLATE INPUT§	175 max.	watts
PLATE DISSIPATION	45 max.	watts

Typical Operation:

DC Plate Voltage	1125	volts
Grid Resistor⊕	2200	ohms
DC Plate Current	125	ma
DC Grid Current (Approx.)	30	ma
Driving Power (Approx.)§§	5	watts
Power Output (Approx.)	135	watts

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

\# For ac filament supply.

⊕ obtained by grid resistor of value shown or by partial self-bias methods.

▲▲ obtained from a fixed supply, by grid resistor (3000,4000) or by cath-resistor (530,590).

□□,▲,⊕,§,§§: See next page. ← indicates a change.

812-A

812-A
POWER TRIODE

□□ Modulation essentially negative may be used, if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

▲ From a self-rectified driver.

● The 812-A can be biased by any convenient method, but the use of a grid resistor is preferred because the bias is automatically varied as the load on the circuit varies. In those applications where grid current and grid voltage may vary widely because of fluctuating loads, it is important to design equipment so that the maximum grid-current and grid-voltage ratings are never exceeded for any load. An approximate rule is to adjust the grid-current and grid-voltage values at full-load to one-half of the corresponding maximum values. This operating condition permits grid-current and grid-voltage values to rise from zero load to twice their full-load values, and usually provides adequate leeway.

§ Power input to plate is 1.23 times the product of DC Plate Voltage and DC Plate Current.

§§ From a driver with a rectified, unfiltered, single-phase, full-wave plate supply.

NOTE: When the 812-A is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With a plate voltage of 1500 volts, a fixed bias of at least -45 volts should be used.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	3.75	4.25	amp
Amplification Factor	1,2	26	32	
Grid-Plate Capacitance . . .	-	4.8	6.2	μμf
Grid-Filament Capacitance. .	-	4.4	6.4	μμf
Plate-Filament Capacitance .	-	0.58	0.96	μμf
Grid Current	1,3	17	39	ma
Plate Current.	1,4	18	42	ma
Useful Power Output.	1,5	140	-	watts

Note 1: DC filament voltage = 6.3 volts.

Note 2: With dc grid voltage of -30 volts and plate voltage adjusted to give plate current of 30 ma.

Note 3: With dc plate voltage of 200 volts and dc grid voltage of +50 volts.

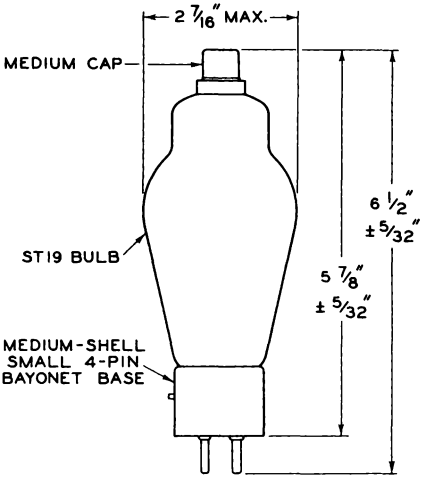
Note 4: With dc plate voltage of 1250 volts and dc grid voltage of -30 volts.

Note 5: With dc plate voltage of 1500 volts, plate current of 175 ma., grid current of 34 to 50 ma., grid resistor of 3500 ± 10% ohms and frequency of 15 Mc.

Data on operating frequencies for the 812-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

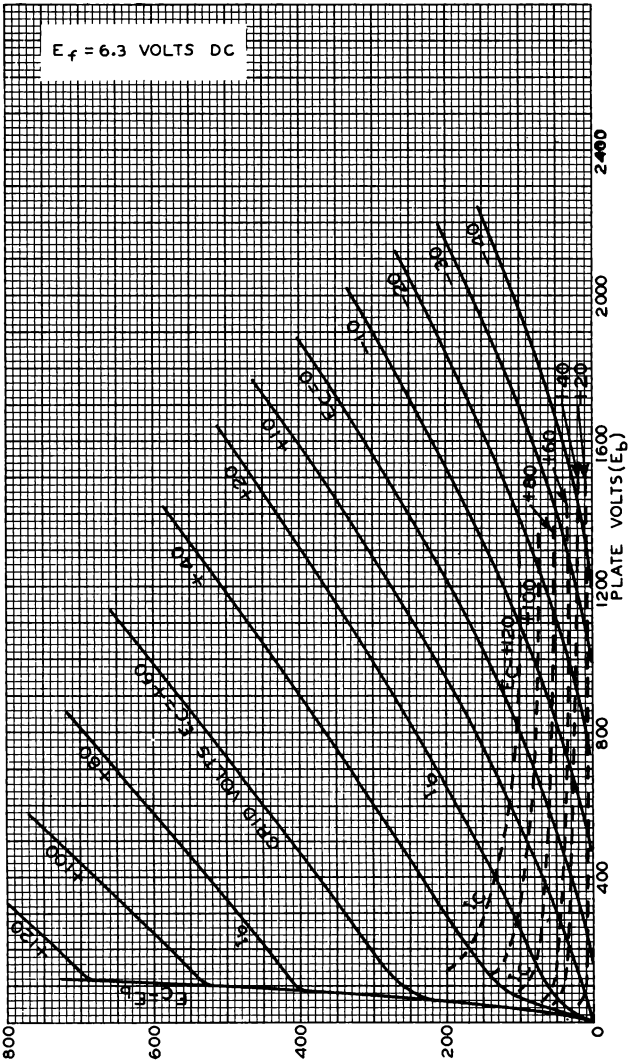
812-A
POWER TRIODE



92CS-6905

812-A

812-A
AVERAGE PLATE CHARACTERISTICS



MAY 13, 1948 TUBE DEPARTMENT 92CM-6074R1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

812-A

OPERATION CHARACTERISTICS

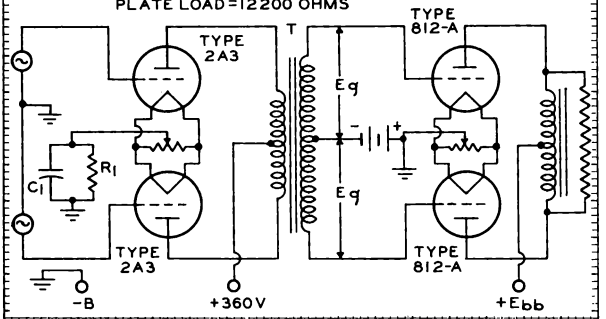
E_f = 6.3 VOLTS AC FOR 812-A's & 2.5 VOLTS AC FOR 2A3's

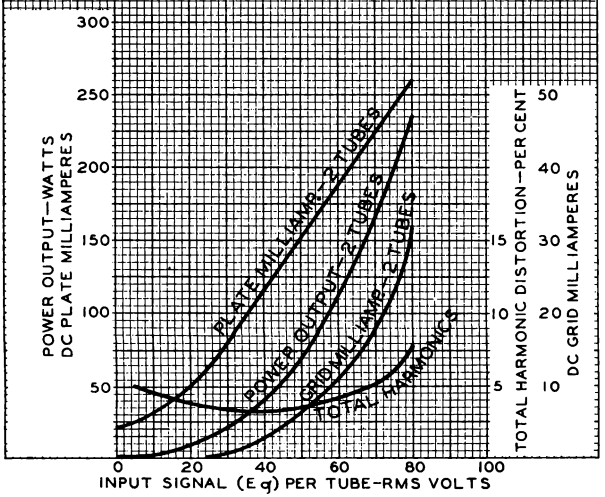
INPUT: CLASS AB_1 – TWO TYPE 2A3's; PLATE-SUPPLY VOLTS = 360; CATHODE-BIAS RESISTOR (R_1) = 780 OHMS; BYPASS CAPACITOR (C_1) = 80 μf

INTERSTAGE TRANSFORMER (T):

VOLTAGE RATIO $\frac{\text{PRIMARY}}{\text{1/2 SEC.}}$ = 1.4

OUTPUT: CLASS B – TWO TYPE 812-A's; PLATE VOLTS (E_{bb}) = 1250; DC GRID VOLTS = -40; PLATE-TO-PLATE LOAD = 12200 OHMS





812-A

812-A

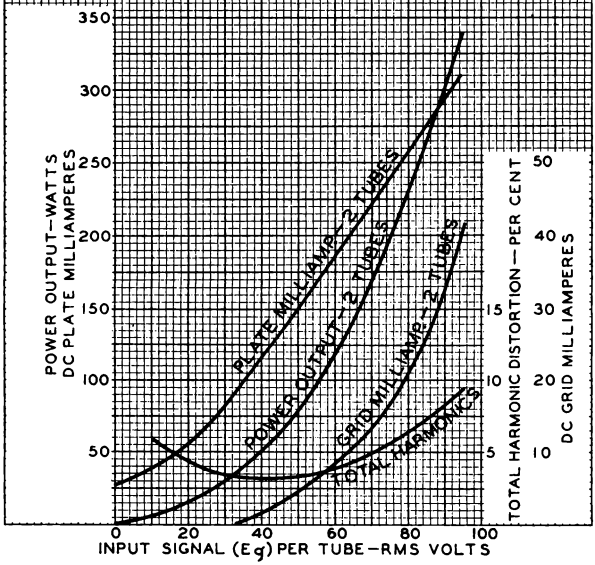
OPERATION CHARACTERISTICS

E_f = 6.3 VOLTS AC FOR 812-A's & 2.5 VOLTS AC FOR 2A3's
CIRCUIT ARRANGEMENT: SAME AS ON DWG. 92CM-6938 UNDER TYPE 812-A

INPUT: CLASS AB_1 — TWO TYPE 2A3's; PLATE-SUPPLY VOLTS = 360; CATHODE-BIAS RESISTOR (R_1) = 780 OHMS; BYPASS CAPACITOR (C_1) = 80 μf

INTERSTAGE TRANSFORMER (T):
VOLTAGE RATIO $\frac{\text{PRIMARY}}{1/2\ \text{SEC.}}$ = 1.4

OUTPUT: CLASS B-TWO TYPE 812-A's; PLATE VOLTS (E_{bb}) = 1500; DC GRID VOLTS = -48; PLATE-TO-PLATE LOAD = 13200 OHMS



813

BEAM POWER TUBE

DATA

Electrical:

Filament, Thoriated Tungsten:
Voltage. . . . . 10.0 ± 5% . . . . ac or dc volts
Current at 10.0 volts. . 5.0 . . . . . amp

Transconductance (Approx.), for plate volts = 2000, grid-No.2 volts = 400, and plate current = 50 ma . . . . . 3750 μmhos

Mu-Factor, grid No.2 to grid No.1, for plate volts = 2000, grid-No.2 volts = 400, and plate current = 50 ma . . . 8.5

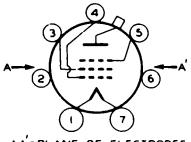
Direct Interelectrode Capacitances:°
Grid No.1 to plate . . . . . 0.25 max. μμf
Grid No.1 to filament, grid No.2, and grid No.3. . . . . 16.3 μμf
Plate to filament, grid No.2, and grid No.3. . . . . 14 μμf

Mechanical:

Mounting Position:
Vertical . . . . . .Base up or down
Horizontal . . . . . Pins 2 and 6 in vertical plane

Maximum Overall Length . . . . . 7-1/2"
Seated Length. . . . . 6-5/8" ± 1/4"
Maximum Diameter . . . . . 2-9/16"
Weight (Approx.) . . . . . 8 oz
Bulb T-20
Cap. . . . . Medium (JETEC No.C1-5)
Base . . . . . Medium-Metal-Shell Giant 7-Pin with Bayonet (JETEC No.A7-17)
Basing Designation for BOTTOM VIEW 5BA

Pin 1 - Filament
Pin 2 - No Connection
Pin 3 - Grid No.2
Pin 4 - Grid No.1



Pin 5 - Grid No.3, Int. Shield
Pin 6 - No Connection
Pin 7 - Filament
Cap - Plate

AA'=PLANE OF ELECTRODES

AF POWER AMPLIFIER & MODULATOR - Class AB_1#

Maximum Ratings, *Absolute Values:*

	CCS●	ICAS●●	
DC PLATE VOLTAGE	2250 max.	2500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	1100 max.	1100 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*.	180 max.	225 max.	ma
MAX.-SIGNAL PLATE INPUT* . . .	360 max.	450 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT* .	22 max.	22 max.	watts
PLATE DISSIPATION*	100 max.	125 max.	watts

° Without external shield and with base shell floating.

#, ●, ●●, *: See next page. ← Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

813

BEAM POWER TUBE

Typical Operation:

Values are for 2 tubes

	CCS●			ICAS●●	
DC Plate Voltage	1500	2000	2250	2500	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	0	volts
DC Grid-No.2 Voltage**	750	750	750	750	volts
DC Grid-No.1 (Control-Grid) Voltage:⊕ *From fixed-bias source*	-85	-90	-95	-95	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage♦	160	160	170	180	volts
Zero-Signal DC Plate Current	50	50	50	50	ma
Max.-Signal DC Plate Current	305	265	255	290	ma
Zero-Signal DC Grid-No.2 Current	2	2	2	2	ma
Max.-Signal DC Grid-No.2 Current	45	43	53	54	ma
Effective Load Resistance (Plate to plate)	9300	16000	20000	19000	ohms
Max.-Signal Driving Power (Approx.)	0	0	0	0	watts
Max.-Signal Power Output (Approx.)	260	335	380	490	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance:##

With fixed bias	30000 max.	ohms
With cathode bias	Not recommended	

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	2000 max.	2250 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	400 max.	volts
DC PLATE CURRENT	100 max.	125 max.	ma
PLATE INPUT	150 max.	200 max.	watts
GRID-No.2 INPUT	15 max.	20 max.	watts
PLATE DISSIPATION	100 max.	125 max.	watts

Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

* Averaged over any audio-frequency cycle of sine-wave form.

** Preferably obtained from a separate source or from the plate-voltage supply with a voltage divider.

♦ The driver stage should be capable of supplying the No.1 grids of the class AB_1 stage with the specified driving voltage at low distortion.

●,●●,†,⊕,##: See next page. → Indicates a change.

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BEAM POWER TUBE

Typical Operation:	CCS●		ICAS●●	
DC Plate Voltage	1500	2000	2250	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	volts
DC Grid-No.2 Voltage	400	400	400	volts
DC Grid-No.1 (Control-Grid) Voltage●♦	-60	-75	-60	volts
Peak RF Grid-No.1 Voltage	70	80	70	volts
DC Plate Current	100	75	85	ma
DC Grid-No.2 Current	4	3	3	ma
DC Grid-No.1 Current	★	★	★	ma
Driving Power□##	▲	▲	▲	watts
Power Output (Approx.)	50	50	70	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance	30000 max.	ohms

GRID-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

	CCS●	ICAS●●	
DC PLATE VOLTAGE	2000 max.	2250 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	100 max.	125 max.	ma
PLATE INPUT	150 max.	200 max.	watts
GRID-No.2 INPUT	15 max.	20 max.	watts
PLATE DISSIPATION	100 max.	125 max.	watts

Typical Operation:

DC Plate Voltage	1500	2000	2250	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	volts
DC Grid-No.2 Voltage	400	400	400	volts
DC Grid-No.1 Voltage♦♦	-140	-120	-110	volts
Peak RF Grid-No.1 Voltage	145	120	135	volts
Peak AF Grid-No.1 Voltage	60	60	55	volts
DC Plate Current	70	75	85	ma
DC Grid-No.2 Current	3	3	2.5	ma
DC Grid-No.1 Current	★	★	★	ma
Driving Power##	□□	□□	□□	watts
Power Output (Approx.)	40	50	75	watts

The type of input coupling network used should not introduce too much resistance in the grid-No.1 circuit. Transformer or impedance coupling devices are recommended. When the 813 is operated in class AB_1 service, only fixed bias should be used.

♦ Use of a fixed supply or bypassed cathode resistor is recommended.

□ At crest of audio-frequency cycle with a modulation factor of 1.0.

▲ Never more than 2 watts.

●, ●●, †, ⊕, ★, ##, ♦♦, □□: See next page. ← Indicates a change.

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BEAM POWER TUBE

→ **Maximum Circuit Values (CCS or ICAS):**

Grid-No.1-Circuit Resistance:		
With fixed bias	30000 max.	ohms
With cathode bias	Not recommended	

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	1600 max.	2000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-300 max.	-300 max.	volts
DC PLATE CURRENT	150 max.	200 max.	ma
DC GRID-No.1 CURRENT	25 max.	30 max.	ma
PLATE INPUT	240 max.	400 max.	watts
GRID-No.2 INPUT	15 max.	20 max.	watts
PLATE DISSIPATION	67 max.	100 max.	watts

Typical Operation:

DC Plate Voltage	1250	1600	2000	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	volts
DC Grid-No.2 Voltage▲▲	300	300	350	volts
From a series resistor of	27000	43000	41000	ohms
DC Grid-No.1 Voltage††	-160	-160	-175	volts
From a grid resistor of	12500	13500	11000	ohms
Peak RF Grid-No.1 Voltage	250	250	300	volts
DC Plate Current	150	150	200	ma
DC Grid-No.2 Current	35	30	40	ma
DC Grid-No.1 Current (Approx.)	13	12	16	ma
Driving Power (Approx.)⊕⊕	2.9	2.7	4.3	watts
Power Output (Approx.)	140	180	300	watts

→ **Maximum Circuit Values (CCS or ICAS):**

Grid-No.1-Circuit Resistance	30000 max.	ohms

★ Usually negligible.

●● Obtained from fixed supply, or cathode resistor unbypassed for audio frequencies.

□□ RF driving power is never more than 2 watts. AF power is usually not more than 1 watt.

▲▲ Obtained from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor of the value shown for each operating condition.

●,●●,†,⊕,⊕⊕,††: See next page. → Indicates a change.

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BEAM POWER TUBE

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without amplitude modulation■

Maximum Ratings, *Absolute Values*:

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	2000 max.	2250 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-300 max.	-300 max.	volts
DC PLATE CURRENT	180 max.	225 max.	ma
DC GRID-No.1 CURRENT	25 max.	30 max.	ma
PLATE INPUT	360 max.	500 max.	watts
GRID-No.2 INPUT	22 max.	22 max.	watts
PLATE DISSIPATION	100 max.	125 max.	watts

Typical Operation:

DC Plate Voltage	1250	1500	2000	2250	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	0	volts
DC Grid-No.2 Voltage■■	300	300	400	400	volts
From a series resistor of	27000	40000	36000	46000	ohms
DC Grid-No.1 Voltage⊕††✱	-75	-90	-120	-155	volts
From a grid resistor of	6000	7500	12000	10000	ohms
From a cathode resistor of	330	400	520	565	ohms
Peak RF Grid-No.1 Voltage	160	175	205	275	volts
DC Plate Current	180	180	180	220	ma
DC Grid-No.2 Current	35	30	45	40	ma
DC Grid-No.1 Current (Approx.)	12	12	10	15	ma
Driving Power (Approx.)✱✱	1.7	1.9	1.9	4.0	watts
Power Output (Approx.)	170	210	275	375	watts

Maximum Circuit Values (CCS or ICAS): ←

Grid-No.1-Circuit Resistance . . . . . 30000 max. ohms

●● Intermittent Commercial and Amateur Service.

⊕ For ac filament supply.

†† Obtained from a grid-No.1 resistor, from cathode resistor, or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

■ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

■■ Obtained from a separate source, from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown for each operating condition. A series grid-No.2 resistor should be used only when the 813 is used in a circuit which is not keyed. Grid-No.2 voltage must not exceed 800 volts under key-up conditions.

✱ If preceding stage is keyed, the grid-No.1 bias must be obtained partially from a fixed supply in order to limit the plate current and, therefore, the plate dissipation to a safe value.

●, †, ✱✱: See next page. ← Indicates a change.

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BEAM POWER TUBE

SELF-RECTIFYING OSCILLATOR or AMPLIFIER - Class C

Maximum CCS● Ratings, *Absolute Values*:

AC PLATE VOLTAGE (RMS)	2800 max.	volts
AC GRID-No.2 (SCREEN) VOLTAGE (RMS)	550 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-100 max.	volts
DC PLATE CURRENT	95 max.	ma
DC GRID-No.1 CURRENT	10 max.	ma
PLATE INPUT★★	295 max.	watts
GRID-No.2 INPUT★★	22 max.	watts
PLATE DISSIPATION	100 max.	watts

Typical Operation:

AC Plate Voltage (RMS)	2800	volts
DC Grid-No.3 (Suppressor) Voltage†	0	volts
AC Grid-No.2 Voltage (RMS)○○	530	volts
DC Grid-No.1 Voltage♦♦	-37	volts
From a grid resistor of	37000	ohms
DC Plate Current	95	ma
DC Grid-No.2 Current	12	ma
DC Grid-No.1 Current (Approx.)	1	ma
Driving Power (Approx.)##‡	1	watt
Output-Circuit Efficiency (Approx.)	75	per cent
Useful Power Output (Approx.)	170♂	watts

→ **Maximum Circuit Values:**

Grid-No.1-Circuit Resistance	30000 max.	ohms

AMPLIFIER or OSCILLATOR - Class C

With Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate and Grid-No.2 Supply

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	1800 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	360 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-200 max.	volts
DC PLATE CURRENT	190 max.	ma
DC GRID-No.1 CURRENT	22 max.	ma
PLATE INPUT‡‡	360 max.	watts
GRID-No.2 INPUT‡‡	22 max.	watts
PLATE DISSIPATION	100 max.	watts

● Continuous Commercial Service.

★★ Power input is 1.11 times the product of the ac voltage (rms) and the dc current.

‡ From a self-rectified driver.

○○ Obtained from a separate ac supply in phase with the plate supply or from a low-voltage tap on the plate transformer. Use of a grid-No.2 series voltage-dropping resistor is not recommended.

‡‡ Power input is 1.23 times the product of dc voltage and dc current.

†, ##, ♦♦, ♂: See next page. → Indicates a change.

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BEAM POWER TUBE

Typical Operation:

DC Plate Voltage	1800	volts
DC Grid-No.3 (Suppressor) Voltage†	0	volts
DC Grid-No.2 Voltage♣	250	volts
DC Grid-No.1 Voltage♦♦	-120	volts
From a grid resistor of	10000	ohms
DC Plate Current	160	ma
DC Grid-No.2 Current	37	ma
DC Grid-No.1 Current (Approx.)	12	ma
Driving Power (Approx.)⊕⊕⊕⊕	2	watts
Output-Circuit Efficiency (Approx.)	75	per cent
Useful Power Output (Approx.)	210⊘	watts

Maximum Circuit Values: ←

Grid-No.1-Circuit Resistance	30000 max.	ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN ←

	Note	*Min.*	*Max.*	
Filament Current	1	4.7	5.3	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	-	0.25	μμf
Grid No.1 to filament, grid No.2, and grid No.3	2	13	19.6	μμf
Plate to filament, grid No.2, and grid No.3	2	10.5	17.5	μμf
Plate current (1)	1,3	35	65	ma
Plate current (2)	1,4	-	2	ma
Grid-No.2 current	1,3	-	4	ma
Useful power output	1,5	198	-	watts

Note 1: With 10 volts dc on filament.

Note 2: With no external shield and with base shell floating.

Note 3: With dc plate voltage of 2000 volts, grid No.3 connected to negative filament terminal, dc grid-No.2 voltage of 400 volts, and dc grid-No.1 voltage of -35 volts.

Note 4: With dc plate voltage of 2000 volts, grid No.3 connected to negative filament terminal, dc grid-No.2 voltage of 400 volts, and dc grid-No.1 voltage of -80 volts.

Note 5: In a self-excited oscillator with dc plate voltage of 2000 volts, grid No.3 connected to negative filament terminal, dc grid-No.2 voltage of 400 volts, dc grid-No.1 current of 9.6 to 14.4 ma, grid-No.1 resistor of 10000 ± 10% ohms, dc plate current of 180 ma, and frequency of 15 Mc.

† Grid No.3 should be connected to mid-tap on filament-transformer secondary winding or to negative end of filament operated on dc.

⊕⊕ Value shown for each operating condition is power required by grid No.1 and biasing device when the 813 is operated at frequency sufficiently low to avoid high-frequency losses. At moderate frequencies, the driver stage should be capable of providing about twice the tabulated value; at higher frequencies, the driver stage may have to supply 3 to 10 times the value shown.

♦♦,⊘,♣,⊕⊕: See next page. ← Indicates a change.

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BEAM POWER TUBE

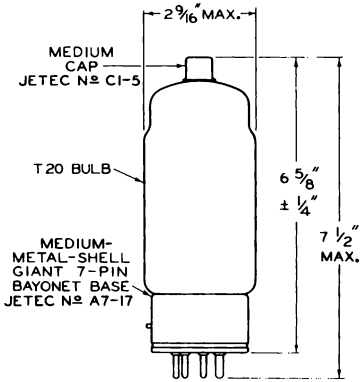
Obtained from a grid-No.1 resistor of the value shown or from a combination of grid-No.1 resistor and cathode resistor. Fixed-bias operation is not recommended. The bias resistors should not be by-passed for the plate and grid-No.2 voltage supply frequency.

This value of useful power is measured at load of output circuit having indicated efficiency.

Obtained from a separate, rectified, unfiltered, single-phase, full-wave supply in phase with the plate supply, or from the rectified, unfiltered, single-phase, full-wave supply by means of taps on the plate transformer.

From a driver with a rectified, unfiltered, single-phase, full-wave plate supply.

Data on operating frequencies for the 813 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY



92CM-4963R3

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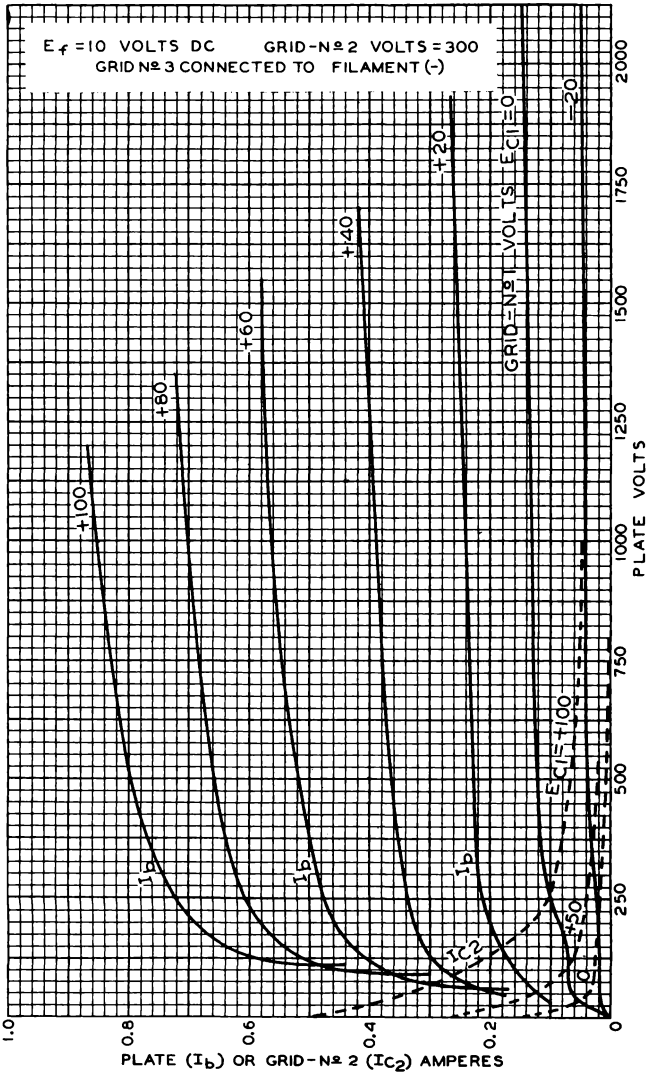
AVERAGE CHARACTERISTICS



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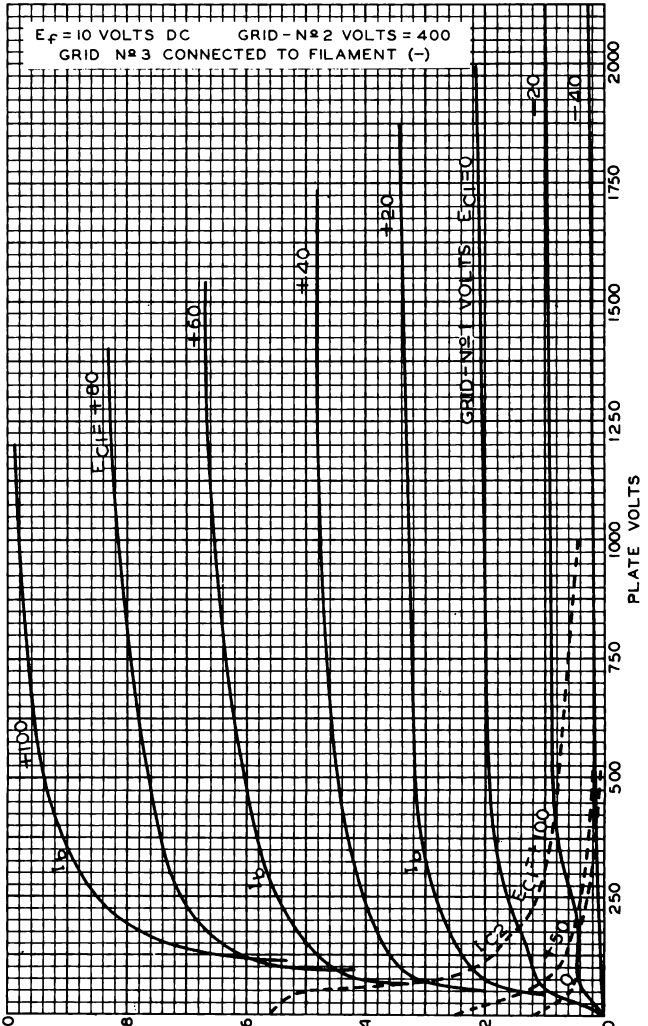
AVERAGE CHARACTERISTICS



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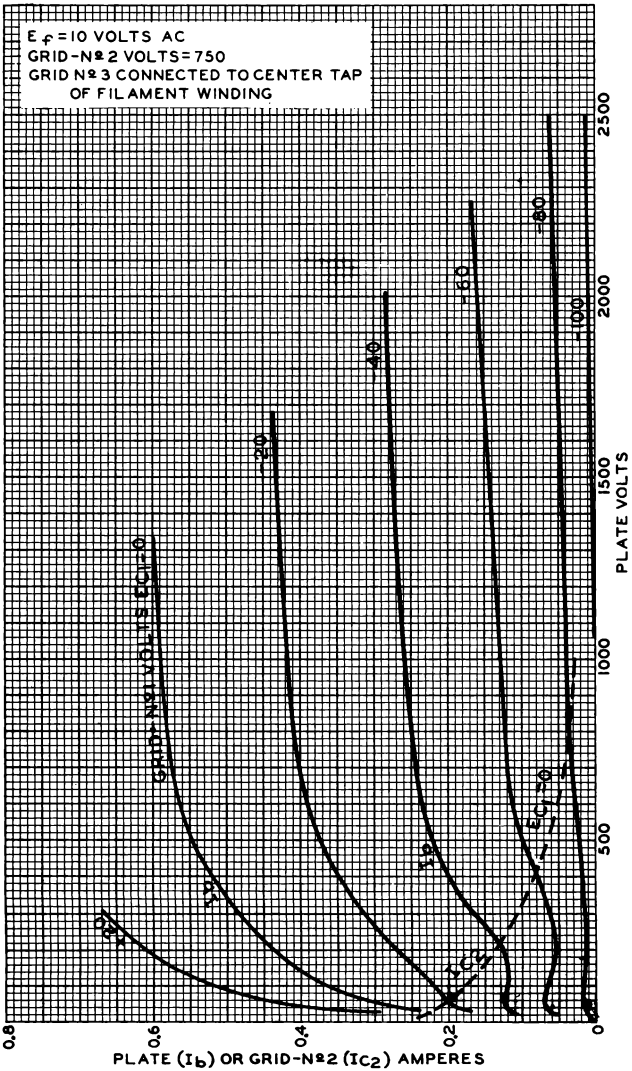
AVERAGE CHARACTERISTICS



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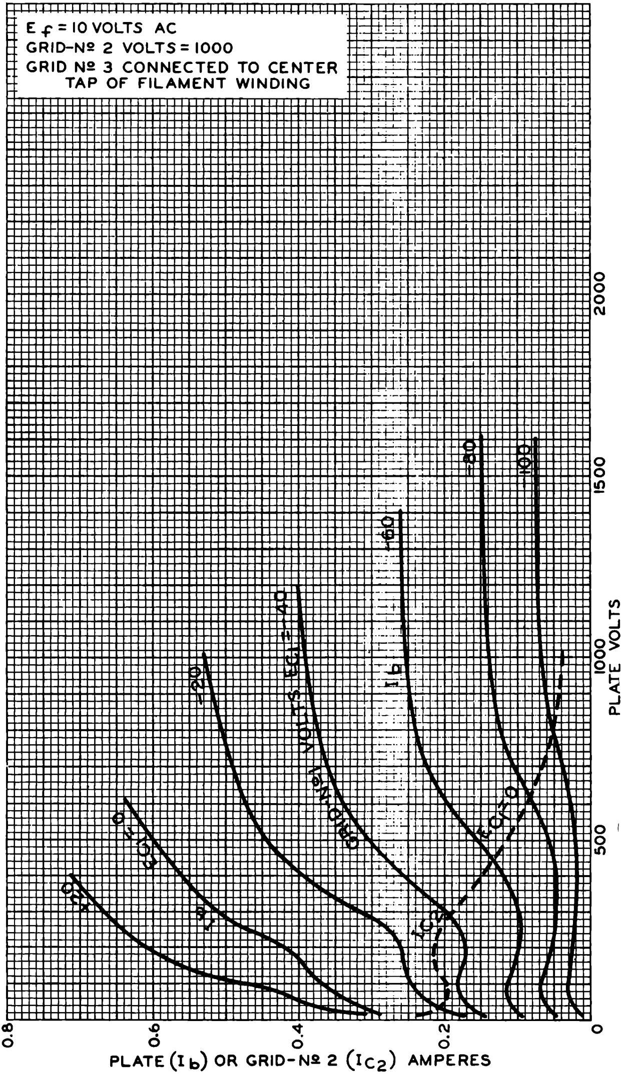
AVERAGE CHARACTERISTICS



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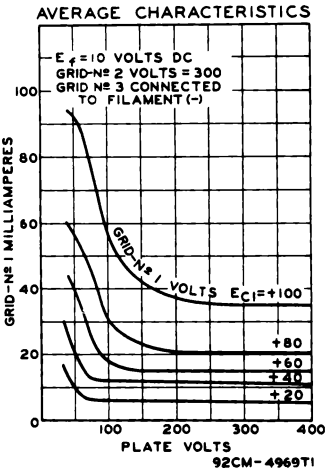
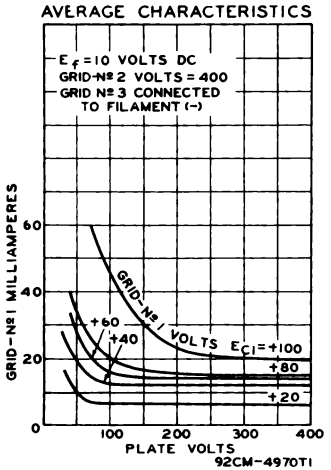
BEAM POWER TUBE





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TRANSMITTING BEAM POWER AMPLIFIER

	CCS●		ICAS●●		
DC PLATE CURRENT	120 max.		150 max.		ma
DC GRID-No.1 CURRENT	15 max.		15 max.		ma
PLATE INPUT	120 max.		180 max.		watts
GRID-No.2 INPUT	6.7 max.		6.7 max.		watts
PLATE DISSIPATION	34 max.		50 max.		watts
Typical Operation:					
DC Plate Voltage	900	1000	1250		volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0		volts
DC Grid-No.2 Voltage▲▲	300	300	300		volts
	40000	40000	48000		ohms
DC Grid-No.1 Voltage††⊕	-150	-150	-150		volts
	15000	15000	15000		ohms
Peak RF Grid-No.1 Voltage	215	222	222		volts
DC Plate Current	120	120	144		ma
DC Grid-No.2 Current	15	17.5	20		ma
DC Grid-No.1 Current (Approx.)*	10	10	10		ma
Driving Power (Approx.)*	2	2	2		watts ←
Power Output (Approx.)	76	87	130		watts

▲▲ Obtained preferably from modulated plate-voltage supply through resistor of value shown.

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation■

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	400 max.	volts ←
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-300 max.	-300 max.	volts
DC PLATE CURRENT	150 max.	150 max.	ma
DC GRID-No.1 CURRENT	15 max.	15 max.	ma
PLATE INPUT	180 max.	225 max.	watts
GRID-No.2 INPUT	10 max.	10 max.	watts
PLATE DISSIPATION	50 max.	65 max.	watts
Typical Operation:			
DC Plate Voltage	1000	1250	1500	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	volts
DC Grid-No.2 Voltage■■⊕	300	300	300	volts
	40000	42000	50000	ohms
DC Grid-No.1 Voltage††⊕	-70	-80	-90	volts
	7000	8000	9000	ohms
	395	455	490	ohms
Peak RF Grid-No.1 Voltage	150	165	170	volts

●, ●●, †, ⊕, *, ††, ■, ■■, ⊕: See next page. ←Indicates a change.

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TRANSMITTING BEAM POWER AMPLIFIER

	CCS●		ICAS●●		
DC Plate Current	150	144	150	. .	ma
DC Grid-No.2 Current	17.5	22.5	24	. .	ma
DC Grid-No.1 Cur. (Approx.)*	10	10	10	. .	ma
Driving Power Approx.)*. . .	1.35	1.5	1.5	. .	watts
Power Output (Approx.) . . .	100	130	160	. .	watts

● Continuous Commercial Service.

●● Intermittent Commercial & Amateur Service.

† Connect grid No.3 to mid-point of filament operated on ac, or to the negative end of filament operated on dc.

* For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—Grid Current and Driving Power in the General Section.

†† Obtained preferably from grid-No.1 resistor, although combination of either grid-No.1 resistor and cathode resistor or grid resistor and fixed supply may be used.

■ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

■■ Obtained from a separate source, from the plate-voltage supply with a voltage divider, or through a series resistor (40000, 42000, 50000).

⊕ If preceding stage is keyed, partial fixed-bias is required.

⊕ For ac filament supply.

→ CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	3.10	3.40	amp
Grid No.1-Plate Capacitance	-	-	0.15	μμf
Input Capacitance.	-	11.1	15.9	μμf
Output Capacitance	-	10.1	16.9	μμf
Plate Current.	1,2	30	48	ma
Grid-No.2 Current.	1,2	-	3.5	ma
Grid-No.1 Current.	1,3	22	52	ma
Power Output	1,4	120	-	watts

NOTE 1: DC filament volts = 10.0.

NOTE 2: With dc plate voltage of 1250 volts; dc grid-No.3 voltage of 0 volts; dc grid-No.2 voltage of 300 volts; and dc grid-No.1 voltage of -19 volts.

NOTE 3: With dc plate voltage of 175 volts; dc grid-No.3 voltage of 0 volts; dc grid-No.2 voltage of 175 volts; and dc grid-No.1 voltage of +65 volts.

NOTE 4: With dc plate voltage of 1250 volts; dc grid-No.3 voltage of 0 volts; dc grid-No.2 voltage of 300 volts; plate current of 150 ma., grid-No.1 current of 10- 15 ma.; grid-No.1 resistor of 8000 ±10% ohms; and frequency of 15 Mc.

OUTLINE DIMENSIONS for Type 814 are the same as those for Type 828.

Data on operating frequencies for the 814 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

→ Indicates a change.

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TRANSMITTING BEAM POWER AMPLIFIER

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage	10 ± 0.5	ac or dc volts
Current	3.25	amp
Transconductance (Approx.) for plate current of 39 ma.	3300	μmhos
Direct Interelectrode Capacitances:°		
Grid No.1 to Plate	0.15 max.	μμf ←
Input	13.5	μμf
Output	13.5	μμf

° Without external shielding.

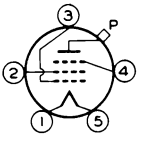
Mechanical:

Mounting Position	Vertical, base down; Horizontal, pins 2 & 4 in vertical plane
Overall Length	7-7/16" ± 1/4"
Seated Length	6-13/16" ± 1/4"
Maximum Diameter	2-1/16"
Bulb	T-16
Cap	Small
Base	Medium-Shell Small 5-Pin, Micanol
Basing Designation for BOTTOM VIEW	5J

Pin 1 - Filament

Pin 2 - Grid No.2

Pin 3 - Grid No.1



Pin 4 - Grid No.3

Pin 5 - Filament

Cap - Plate

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

	CCS●	ICAS●●	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	400 max.	volts ←
DC PLATE CURRENT	60 max.	60 max.	ma
PLATE INPUT	75 max.	90 max.	watts
GRID-No.2 INPUT	6.7 max.	6.7 max.	watts
PLATE DISSIPATION	50 max.	60 max.	watts

Typical Operation:

DC Plate Voltage	1000	1250	1500	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	volts
DC Grid-No.2 Voltage	200	200	250	volts
DC Grid-No.1 (Control-Grid) Voltage⊕	-28	-28	-35	volts

●, ●●, †, ⊕: See next page.

← Indicates a change.

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TRANSMITTING BEAM POWER AMPLIFIER

	CCS●		ICAS●●		
Peak RF Grid-No.1 Voltage. .	50	50	56	. .	volts
DC Plate Current	60	60	60	. .	ma
DC Grid-No.2 Current	1.3	1	1.5	. .	ma
DC Grid-No.1 Current (Approx.)* . . .	1.8	1.8	1.5	. .	ma
Driving Power (Approx.)□* .	0.65	0.65	0.85	. .	watt
Power Output (Approx.) . . .	20	25	30	. .	watts

GRID-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

	CCS●	ICAS●●	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
→ DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . . .	-250 max.	-250 max.	volts
DC PLATE CURRENT	60 max.	60 max.	ma
PLATE INPUT.	75 max.	90 max.	watts
GRID-No.2 INPUT.	6.7 max.	6.7 max.	watts
PLATE DISSIPATION.	50 max.	60 max.	watts

Typical Operation:

DC Plate Voltage	1000	1250	1500	. .	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	. .	volts
DC Grid-No.2 Voltage	200	200	250	. .	volts
DC Grid-No.1 Voltage⊕ . . .	-100	-100	-120	. .	volts
Peak RF Grid-No.1 Voltage. .	129	129	150	. .	volts
→ Peak AF Grid-No.1 Voltage. .	64	64	90	. .	volts
DC Plate Current	60	60	60	. .	ma
DC Grid-No.2 Current	2	1.4	3	. .	ma
DC Grid-No.1 Current (Approx.)*. . . .	3	2.8	2.5	. .	ma
Driving Power (Approx.)□* .	2.5	2.3	4.2	. .	watts
Power Output (Approx.) . . .	25	29	35	. .	watts

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

	CCS●	ICAS●●	
DC PLATE VOLTAGE	1000 max.	1250 max.	volts
→ DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-300 max.	-300 max.	volts

□ At crest of audio-frequency cycle with a modulation factor of 1.0.

●,●●,†,⊕,*: See next page. → Indicates a change.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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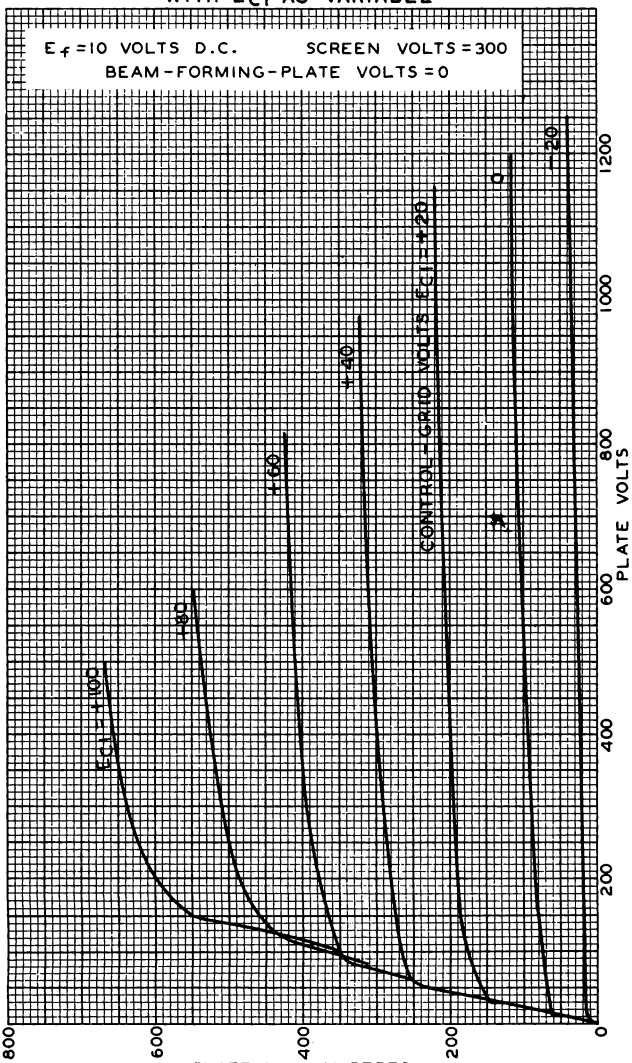
AVERAGE PLATE CHARACTERISTICS
WITH E_{C1} AS VARIABLE



NOV. 11, 1937

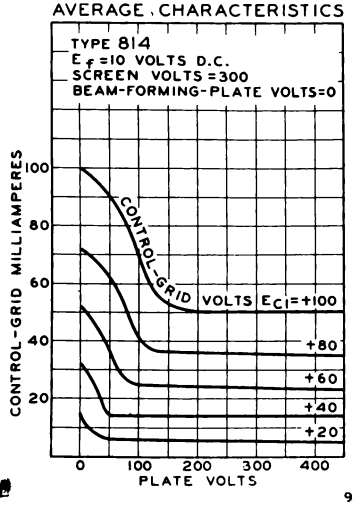
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4845

814

814

TRANSMITTING BEAM POWER AMPLIFIER



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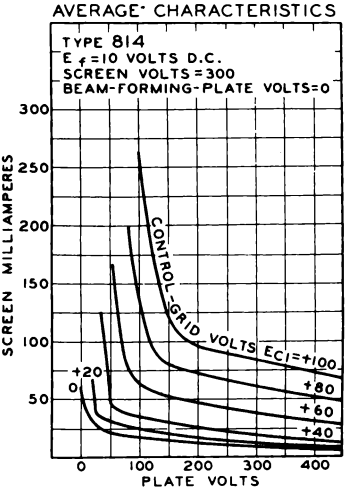

92C-4847

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PUSH-PULL R-F BEAM POWER AMPLIFIER

Unless otherwise specified, values are for both units

Heater	Coated Unipotential Cathode▽		
Heater Arrangement	*Series*	*Parallel*	
Voltage †	12.6	6.3	a-c or d-c volts
Current	0.8	1.6	amp.
Transconductance, for plate current of 25 ma.	4000		µmhos
Grid-Screen Mu-Factor	6.5		
Direct Interelectrode Capacitances (each unit):			
Grid-Plate (with external shielding)		0.2 max.	µµf
Input		14	µµf
Output		8.5	µµf
Maximum Overall Length		4-9/16"	
Maximum Radius		1-3/16"	
Bulb		T-16	
Caps (two)		Small	
Base		Large Wafer Octal 8-Pin, Sleeve	
RCA Socket		Stock No. 9924	←

† Should not deviate more than ±10% from the rated value.

▽ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should not exceed 100 volts.

Maximum Ratings Are Absolute Values

MAXIMUM CCS and ICAS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service
ICAS = Intermittent Commercial and Amateur Service

A-F POWER AMPLIFIER & MODULATOR - Class AB_2#

	CCS	*ICAS*	
D-C Plate Voltage	400 max.	500 max.	volts
D-C Screen Voltage (Grid #2)	225 max.	225 max.	volts ←
Max.-Sig. D-C Plate Current*	150 max.	150 max.	ma.
Max.-Sig. Plate Input*	60 max.	75 max.	watts
Max.-Sig. Screen Input*	4.5 max.	4.5 max.	watts ←
Plate Dissipation*	20 max.	25 max.	watts
Typical Operation:			
D-C Plate Voltage	400	500	volts
D-C Screen Voltage**‡	125	125	volts
D-C Grid Voltage (Fixed bias, Grid #1)	-15	-15	volts
Peak A-F Grid-to-Grid Volt.	60	60	volts
Zero-Sig. D-C Plate Current	20	22	ma.
Max.-Sig. D-C Plate Current	150	150	ma.
Max.-Sig. D-C Screen Current	32	32	ma.
Load Resistance (Per plate)	1550	2000	ohms
Effective Load Resistance (Plate to plate)	6200	8000	ohms
Max.-Sig. Driving Power♦	0.36	0.36	approx.watt
Max.-Sig. Power Output	42	54	approx.watts

Subscript 2 indicates that grid current flows during some part of input cycle.

** ‡: See end of tabulation.

* Averaged over any audio-frequency cycle of sine-wave form.

♦ Driver stage should be capable of supplying the grids of the class AB_2 stage with the specified driving power at low distortion. The effective resistance per grid circuit of the class AB_2 stage should be kept below 500 ohms and the effective impedance at the highest desired response frequency should not exceed 700 ohms.

← Indicates a change.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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PUSH-PULL R-F BEAM POWER AMPLIFIER

(continued from preceding page)

PUSH-PULL R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS	ICAS	
D-C Plate Voltage	400 max.	500 max.	volts
→ D-C Screen Voltage (Grid #2)	225 max.	225 max.	volts
D-C Plate Current	75 max.	75 max.	ma.
Plate Input	30 max.	37.5 max.	watts
→ Screen Input	4.0 max.	4.0 max.	watts
Plate Dissipation	20 max.	25 max.	watts
Typical Operation:			
D-C Plate Voltage	400	500	volts
D-C Screen Voltage** ‡	125	125	volts
D-C Grid Voltage (Grid #1) ■	-25	-25	volts
Peak R-F Grid-to-Grid Volt.	50	50	volts
D-C Plate Current	75	75	ma.
D-C Screen Current	4	3	ma.
D-C Grid Current	Negligible		ma.
Driving Power°	0.8	0.7	approx. watt
Power Output	10.5	13	approx. watts

GRID-MODULATED PUSH-PULL R-F POWER AMP. - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS	ICAS	
D-C Plate Voltage	400 max.	500 max.	volts
→ D-C Screen Voltage (Grid #2)	225 max.	225 max.	volts
D-C Grid Voltage (Grid #1)	-175 max.	-175 max.	volts
D-C Plate Current	75 max.	75 max.	ma.
Plate Input	30 max.	37.5 max.	watts
→ Screen Input	4.0 max.	4.0 max.	watts
Plate Dissipation	20 max.	25 max.	watts
Typical Operation:			
D-C Plate Voltage	400	500	volts
D-C Screen Voltage ‡ **	125	125	volts
D-C Grid Voltage ■	-40	-40	volts
Peak R-F Grid-to-Grid Volt.	80	80	volts
Peak A-F Grid Voltage	19	17	volts
D-C Plate Current	75	75	ma.
D-C Screen Current	3	3	ma.
D-C Grid Current	0.4	0.4	approx. ma.
Driving Power°	0.32	0.28	approx. watt
Power Output	10.5	13	approx. watts

° At crest of audio-frequency cycle with modulation factor of 1.0.
■ Obtained preferably from a fixed supply.

PLATE-MODULATED PUSH-PULL R-F POWER AMP. - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS	ICAS	
D-C Plate Voltage	325 max.	400 max.	volts
→ D-C Screen Voltage (Grid #2)	225 max.	225 max.	volts
D-C Grid Voltage (Grid #1)	-175 max.	-175 max.	volts
D-C Plate Current	125 max.	150 max.	ma.

**, ‡: See end of tabulation. ← Indicates a change.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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PUSH-PULL R-F BEAM POWER AMPLIFIER

(continued from preceding page)

	CCS	ICAS		
D-C Grid Current	7 max.	7 max.	ma.	←
Plate Input	40 max.	60 max.	watts	
Screen Input	4.0 max.	4.0 max.	watts	←
Plate Dissipation	13.5 max.	20 max.	watts	
Typical Operation:				
D-C Plate Voltage	325	400	volts	
D-C Screen Voltage□ ‡	165	175	volts	
	10000	15000	ohms	
D-C Grid Voltage § ⊕	-45	-45	volts	
	11250	15000	ohms	
Peak R-F Grid-to-Grid Volt.	112	116	volts	
D-C Plate Current	123	150	ma.	
D-C Screen Current	16	15	ma.	
D-C Grid Current	4	3	approx. ma.	
Driving Power	0.2	0.16	approx. watt	
Power Output	30	45	approx. watts	

□ Preferably obtained from a separate source modulated with the plate supply, or obtained from the modulated plate-supply through resistor of value shown.

§ Obtained from grid resistor of value shown (per tube) or by partial self-bias methods.

PUSH-PULL R-F POWER AMPLIFIER & OSCILLATOR—Class C Telegraphy

Key-down conditions per tube without modulation ##

	CCS	ICAS		
D-C Plate Voltage	400 max.	500 max.	volts	
D-C Screen Voltage (Grid #2)	225 max.	225 max.	volts	←
D-C Grid Voltage (Grid #1)	-175 max.	-175 max.	volts	
D-C Plate Current	150 max.	150 max.	ma.	
D-C Grid Current	7 max.	7 max.	ma.	←
Plate Input	60 max.	75 max.	watts	
Screen Input	4.5 max.	4.5 max.	watts	←
Plate Dissipation	20 max.	25 max.	watts	
Typical Operation:				
D-C Plate Voltage	400	500	volts	
D-C Screen Voltage▲ ‡	145	200	volts	
	15000	17500	ohms	
D-C Grid Voltage⊠ ⊕	-45	-45	volts	
	10000	13000	ohms	
	260	265	ohms	
Peak R-F Grid-to-Grid Volt.	116	112	volts	
D-C Plate Current	150	150	ma.	
D-C Screen Current	17	17	ma.	
D-C Grid Current	4.5	3.5	approx. ma.	
Driving Power	0.23	0.18	approx. watt	
Power Output	44	56	approx. watts	

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

‡: See next page.

▲ Obtained from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown. The screen voltage must not exceed 600 volts under key-up conditions.

⊠ Obtained from fixed supply, by grid resistor (10000,13000), or cathode resistor (260, 265).

⊕ The grid-circuit resistance should never exceed 15000 ohms (total) per tube, or 30000 ohms per unit. Any additional bias required must be supplied by a cathode resistor or a fixed supply. ← Indicates a change.

815

PUSH-PULL R-F BEAM POWER AMPLIFIER

(continued from preceding page)

** Preferably obtained from a separate source, or from the plate-voltage supply with a voltage divider.

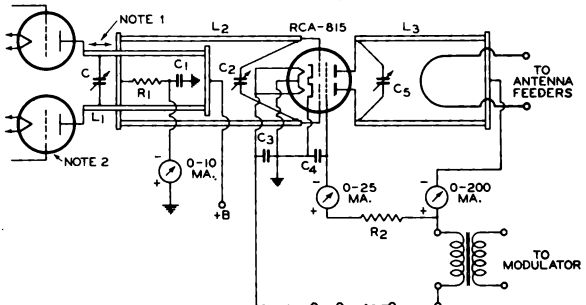
‡ In applications requiring the use of screen voltages above 135 volts, provision should be made for the adjustment of control-grid bias for each unit separately. The necessity for this adjustment at the lower screen voltages depends on the distortion requirements and on whether the plate-dissipation rating is exceeded at zero-signal plate current.

Data on operating frequencies for the 815 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

Shielding and by-passing considerations for the 815 are similar to those given under Type 832-A.

ULTRA-HIGH-FREQUENCY PLATE-MODULATED PUSH-PULL R-F POWER AMPLIFIER

112-116 Mc



C	See L_1
C_1 C_3 C_4	1" x 1½" copper sheet insulated from chassis by mica sheet 0.002" thick, or 0.0005-μf "postage stamp" mica condensers soldered to chassis with shortest practicable leads.
C_2 C_5	Copper discs, 1/16" x 1½". Solder discs to 10-32 brass screws 1" long. Drill and tap grid and plate lines for 10-32 screws.
R_1	15000 ohms, 0.5 watt
R_2	15000 ohms, 25 watts, adjustable.
L_1	½" dia. copper tubing. Length of tubing and capacitance of C depend upon driver tubes employed.
L_2	½" dia. copper tubing, 12½" long and spaced approx. 7/8" between centers.
L_3	½" dia. copper tubing, 13" long and spaced approx. 7/8" between centers.

NOTES

(1) The r-f driver stage should be able to deliver about one watt of useful r-f power, in order to insure ample grid excitation for the 815.
(2) Adjust coupling between L_1 and L_2 and tuning of C and C_2 for recommended d-c grid current of the 815.
(3) L_1 and L_2 should be effectively shielded from L_3 by a metal chassis, or by a vertical metal baffle plate used to mount the 815.
(4) Adjust coupling of "hairpin" antenna coil to L_3 so that the amplifier is properly loaded.
(5) A small lumped inductance can be substituted for the amplifier grid lines, if desired. Such a grid coil is preferably tuned by varying its inductance rather than by means of a variable condenser.

The license extended to the purchaser of tubes appears in the License Notice accompanying them. Information contained herein is furnished without assuming any obligations.

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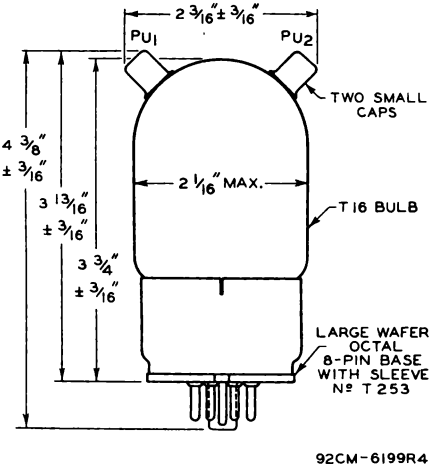
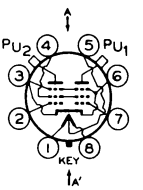
PUSH-PULL R-F BEAM POWER AMPLIFIER



BOTTOM VIEW OF SOCKET CONNECTIONS

Pin 1 - Heater
Pin 2 - Grid No.1 of Unit No.2
Pin 3 - Cathode, Internal Shield
Pin 4 - Grid No.2
Pin 5 - Heater Center-Tap



Pin 6 - Cathode, Internal Shield
Pin 7 - Grid No.1 of Unit No.1
Pin 8 - Heater
P_{U1} & P_{U2} - Plate Terminals of Units No.1 & No.2, respectively

PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

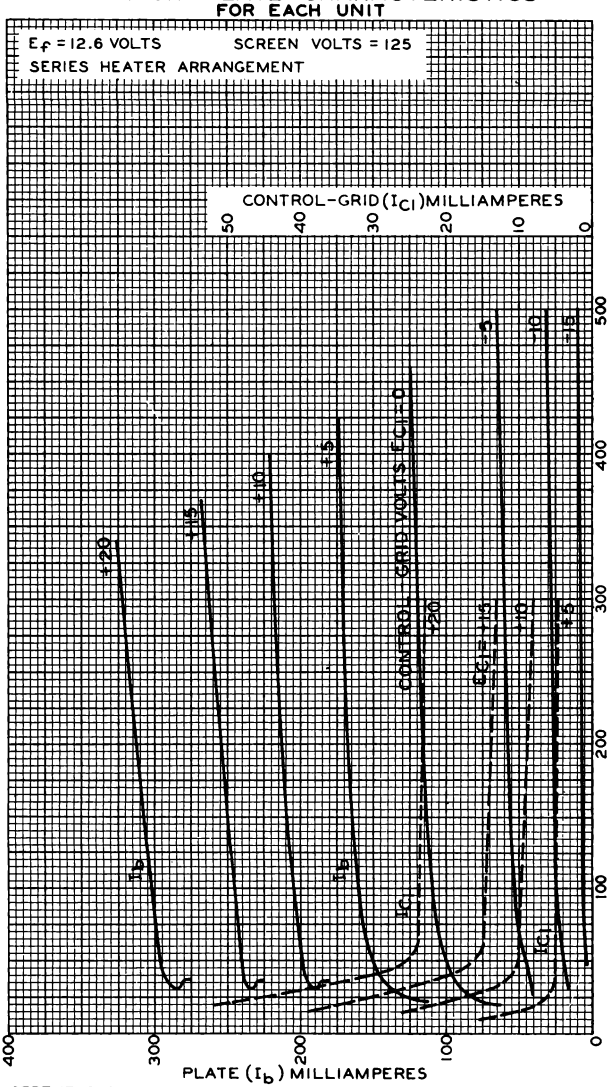
TUBE MOUNTING POSITION

Any

815

815

AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



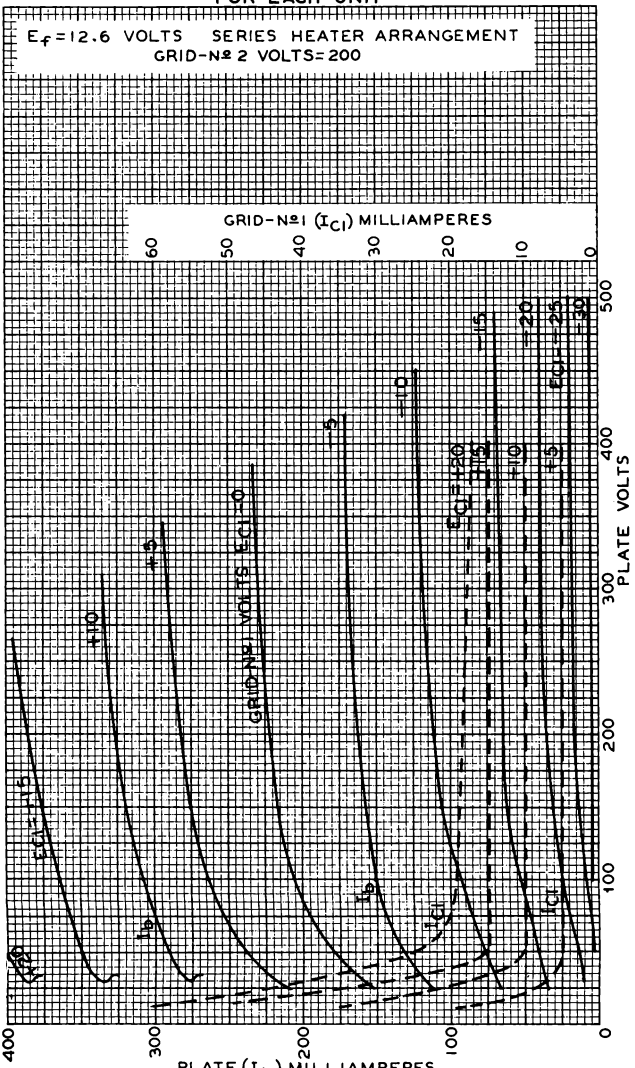
SEPT. 17, 1943

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92C-6206R1

815
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



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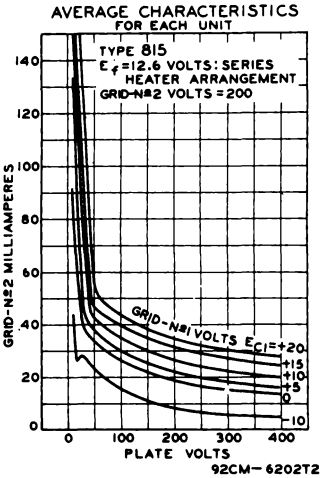
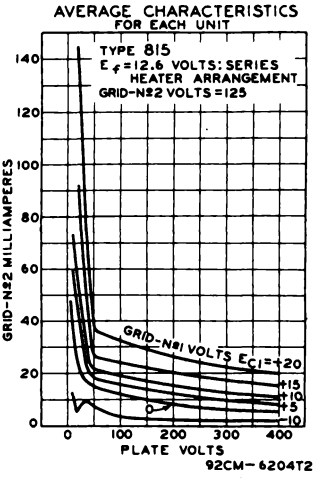
PUSH-PULL R-F BEAM POWER AMPLIFIER





816

HALF-WAVE MERCURY-VAPOR RECTIFIER

GENERAL DATA

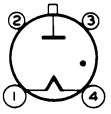
Electrical:

Filament, Coated:		
Voltage	2.5	ac volts
Current	2.0	amp
Heating Time	10	sec.
Tube Voltage Drop (Approx.)	15	volts

Mechanical:

Mounting Position	Vertical, Base Down
Overall Length	4-9/16" ± 1/8"
Seated Length	3-15/16" ± 1/8"
Maximum Diameter	1-9/16"
Bulb	ST-12
Cap	Small
Base	Small-Shell Small 4-Pin
Basing Designation for BOTTOM VIEW	4P

Pin 1 - Filament
Pin 2 - No Connection
Pin 3 - No Connection



Pin 4 - Filament, Cathode Shield
Cap - Anode

HALF-WAVE RECTIFIER

Maximum Ratings, ***Absolute Values:*** •

COND.-MERCURY TEMP. RANGE	20 - 60	°C
PEAK INVERSE ANODE VOLTAGE	7500 max.	volts
PEAK ANODE CURRENT	500 max.	ma
AVERAGE ANODE CURRENT	125 max.	ma

• For supply frequency up to 150 cycles per second.

The table on the following page classifies suitable rectifier circuits for the 816 and shows their safe maximum input and maximum output operating conditions for a peak inverse voltage of 7500 volts. These values are based on a sine-wave input and the use of a suitable choke preceding any capacitor in the filter circuit.

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816

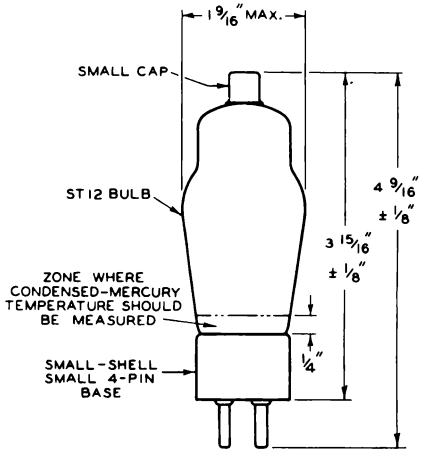
HALF-WAVE MERCURY-VAPOR RECTIFIER

CIRCUIT□	MAXIMUM AC INPUT VOLTS (RMS)*	APPROX. DC OUTPUT VOLTS TO FILTER*	MAXIMUM DC LOAD CURRENT amperes
SINGLE-PHASE FULL-WAVE (2 tubes) FIG. 1	5300 total	2390	0.25
SINGLE-PHASE FULL-WAVE (4 tubes) FIG. 2	5300 total	4780	0.25
THREE-PHASE HALF-WAVE FIG. 3	3050 per leg	3570	0.375
THREE-PHASE DOUBLE-Y PARALLEL FIG. 4	3050 per leg	3570	0.75
THREE-PHASE FULL-WAVE FIG. 5	3050 per leg	7140	0.375

□ For RECTIFIER CIRCUITS and RF FILTER CONSIDERATIONS refer to Type 872-A

* For maximum peak inverse voltage of 7500 volts.

NOTE: If the anode-return of each tube is not connected to the center tap of the filament-supply winding, the return should be made to that side of the filament to which the cathode shield is connected.



92CM-6277R2

826
TRANSMITTING TRIODE

GENERAL DATA

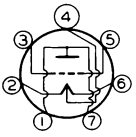
Electrical:

Filament, Thoriated Tungsten:†		
Voltage	7.5	ac or dc volts
Current	4	amp
Amplification Factor	31	
Direct Interelectrode Capacitances:		
Grid to Plate	3	μμf ←
Grid to Filament	3	μμf ←
Plate to Filament	1.1	μμf ←

Mechanical:

Mounting Position	Vertical Only, Base up or down
Overall Length	3-1/2" ± 3/16"
Seated Length	3-1/16" ± 3/16"
Maximum Diameter	See Outline Drawing
Bulb	T-16
Base	Medium Molded-Flare Septar 7-Pin
Basing Designation for BOTTOM VIEW	7B0

Pin 1 - Plate
Pin 2 - Filament
Pin 3 - Grid
Pin 4 - Filament Center-Tap



Pin 5 - Grid
Pin 6 - Filament
Pin 7 - Plate

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*: ←

	NATURAL COOLING CCS●	ICAS●●	
DC PLATE VOLTAGE	800 max.	1000 max.	volts
DC GRID VOLTAGE	-600 max.	-600 max.	volts
DC PLATE CURRENT	95 max.	125 max.	ma
DC GRID CURRENT	40 max.	40 max.	ma
PLATE INPUT	60 max.	95 max.	watts
PLATE DISSIPATION	30 max.	45 max.	watts

Typical Operation with Natural Cooling: ←

DC Plate Voltage	-	1000	volts
DC Grid Voltage⊕#	-	-160	volts
	-	4000	ohms
Peak RF Grid Voltage	-	320	volts
DC Plate Current	-	95	ma
DC Grid Current (Approx.)□	-	40	ma
Driving Power (Approx.)□	-	11.5	watts
Power Output (Approx.)	-	70	watts

†,●,●●,⊕,#,□: See next page.
← Indicates a change.

826

TRANSMITTING TRIODE

→ **Maximum Ratings,** *Absolute Values*:	FORCED-AIR COOLING *CCS*●	*ICAS*●●	
DC PLATE VOLTAGE	800 max.	1000 max.	volts
DC GRID VOLTAGE	-600 max.	-600 max.	volts
DC PLATE CURRENT	95 max.	125 max.	ma
DC GRID CURRENT	40 max.	40 max.	ma
PLATE INPUT	75 max.	125 max.	watts
PLATE DISSIPATION	40 max.	60 max.	watts

→ **Typical Operation with Forced-Air Cooling:**			
DC Plate Voltage	800	1000	volts
DC Grid Voltage●#	-100	-100	volts
	2800	2800	ohms
Peak RF Grid Voltage	198	210	volts
DC Plate Current	94	125	ma
DC Grid Current (Approx.)□	35	35	ma
Driving Power (Approx.)□	6.3	6.6	watts
Power Output (Approx.)	53	90	watts

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

→ **Maximum Ratings,** *Absolute Values*:	NATURAL COOLING *CCS*●	*ICAS*●●	
DC PLATE VOLTAGE	1000 max.	1000 max.	volts
DC GRID VOLTAGE	-600 max.	-600 max.	volts
DC PLATE CURRENT	125 max.	140 max.	ma
DC GRID CURRENT	40 max.	40 max.	ma
PLATE INPUT	95 max.	130 max.	watts
PLATE DISSIPATION	45 max.	55 max.	watts

→ **Typical Operation with Natural Cooling:**			
DC Plate Voltage	-	1000	volts
DC Grid Voltage#▲	-	-70	volts
	-	2000	ohms
	-	425	ohms
Peak RF Grid Voltage	-	183	volts
DC Plate Current	-	130	ma
DC Grid Current (Approx.)	-	35	ma
Driving Power (Approx.)	-	5.8	watts
Power Output (Approx.)	-	90	watts

→ **Maximum Ratings,** *Absolute Values*:	FORCED-AIR COOLING *CCS*●	*ICAS*●●	
DC PLATE VOLTAGE	1000 max.	1250 max.	volts
DC GRID VOLTAGE	-600 max.	-600 max.	volts
DC PLATE CURRENT	125 max.	140 max.	ma
DC GRID CURRENT	40 max.	40 max.	ma
PLATE INPUT	125 max.	175 max.	watts
PLATE DISSIPATION	60 max.	75 max.	watts

†, ●, ●●, ●, #, □, □□, ▲: See next page. → Indicates a change.

826

TRANSMITTING TRIODE

Typical Operation with Forced-Air Cooling: ←

DC Plate Voltage	1000	1250	volts
DC Grid Voltage#▲	-70	-125	volts
	2000	3600	ohms
	440	780	ohms
Peak RF Grid Voltage	183	245	volts
DC Plate Current	125	125	ma
DC Grid Current (Approx.)	35	35	ma
Driving Power (Approx.)	5.8	7.7	watts
Power Output (Approx.)	86	120	watts

† The filament is center-tapped and the center lead is brought out of the tube. With this design, it is possible to minimize the effect of filament-lead inductance by connecting all three filament leads in parallel through rf by-pass capacitors. The center lead of this parallel connection should not be returned directly to the center-tap of the filament-transformer winding or to ground, although it may be by-passed to either of these points if desired. RF by-passing of the grid- and plate-return circuits should be made to the center lead of the filament.

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

● Obtained by grid resistor of value shown. Fixed supply not recommended for linear modulation.

Grid voltages are given with respect to the mid-point of filament operated on ac. If dc is used, each stated value of grid voltage should be decreased by one-half the filament voltage and the circuit returns made to the negative end of the filament.

□ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

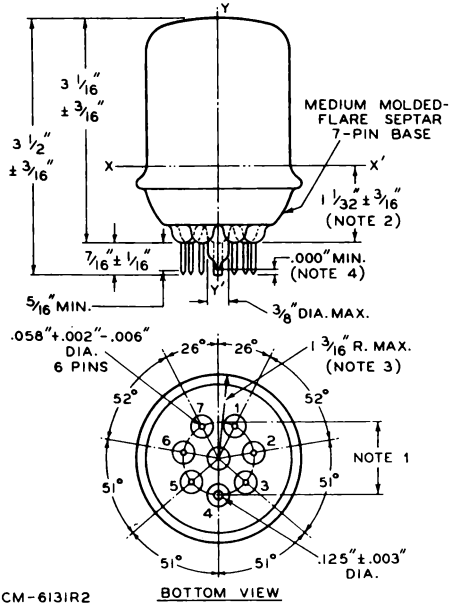
▲ Obtained from fixed supply, by grid resistor (2000, 2000, 3600) or by cathode resistor (425, 440, 780).

NOTE: When the 826 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With plate voltage of 1250 volts, a fixed bias of at least -22.5 volts should be used.

Data on operating frequencies for the 826 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY. Adequate shielding must be provided at the higher frequencies. At the very-high frequencies, push-pull operation is recommended and it is desirable to use each tube with its two grid terminals connected together as well as its two plate terminals connected together, in order to reduce the respective lead inductances.

← Indicates a change.

826
TRANSMITTING TRIODE



92CM-6131R2

THE REFERENCE AXIS YY' IS DEFINED AS THE AXIS OF THE BASE-PIN GAUGE DESCRIBED IN NOTE 1.

NOTE 1: ANGULAR VARIATIONS BETWEEN PINS AND VARIATION IN PIN-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT PINS WILL ENTER TO A DISTANCE OF 0.375" A FLAT-PLATE BASE-PIN GAUGE HAVING SIX HOLES 0.0800" ± 0.0005" AND ONE HOLE 0.1450" ± 0.0005" ARRANGED ON A 1.0000" ± 0.0005" CIRCLE AT SPECIFIED ANGLES WITH TOLERANCE OF ±5' FOR EACH ANGLE. GAUGE IS ALSO PROVIDED WITH A HOLE 0.500" ± 0.010" CONCENTRIC WITH PIN CIRCLE WHOSE CENTER IS ON THE AXIS YY'.

NOTE 2: A FLAT-PLATE FLANGE GAUGE WITH HOLE 2.063" - 0.000" + 0.003" IS LOWERED OVER TUBE SEATED IN BASE-PIN GAUGE SO THAT THE HOLE AXIS IS COINCIDENT WITH AXIS YY' WITHIN 0.150", AND SO THAT THE BOTTOM SURFACE OF THE

(continued on next page)

826
TRANSMITTING TRIODE

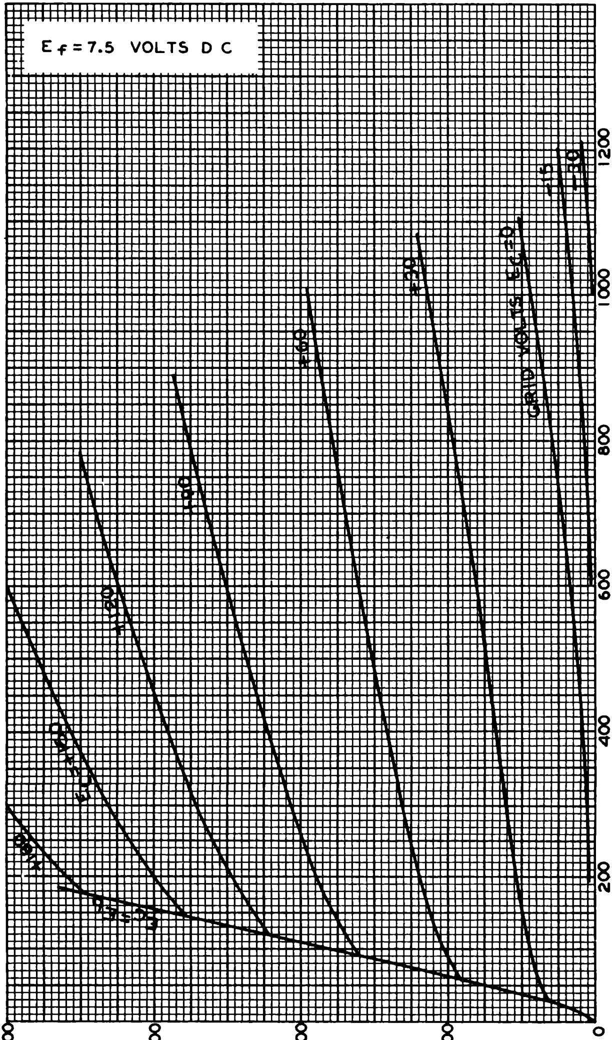
FLANGE GAUGE IS PARALLEL TO THE TOP SURFACE OF THE BASE-PIN GAUGE, AND UNTIL THE FLANGE GAUGE RESTS ON THE TUBE-FLANGE SEAL AT POSITION XX'. THE PERPENDICULAR DISTANCE BETWEEN THE TWO GAUGES WILL BE AS SHOWN.

NOTE 3: MINIMUM DIAMETER OF TUBE-SEAL FLANGE WILL BE SUCH THAT A RING GAUGE HAVING I.D. OF 2.125" - 0.000" + 0.003" AND THICKNESS OF 0.125" ± 0.010" WILL NOT PASS THE FLANGE WHEN TRIED AT ANY ANGLE.

NOTE 4: EXHAUST TIP WILL NOT EXTEND BEYOND THE PLANE WHICH PASSES THROUGH THE ENDS OF THE THREE LONGEST PINS.

826

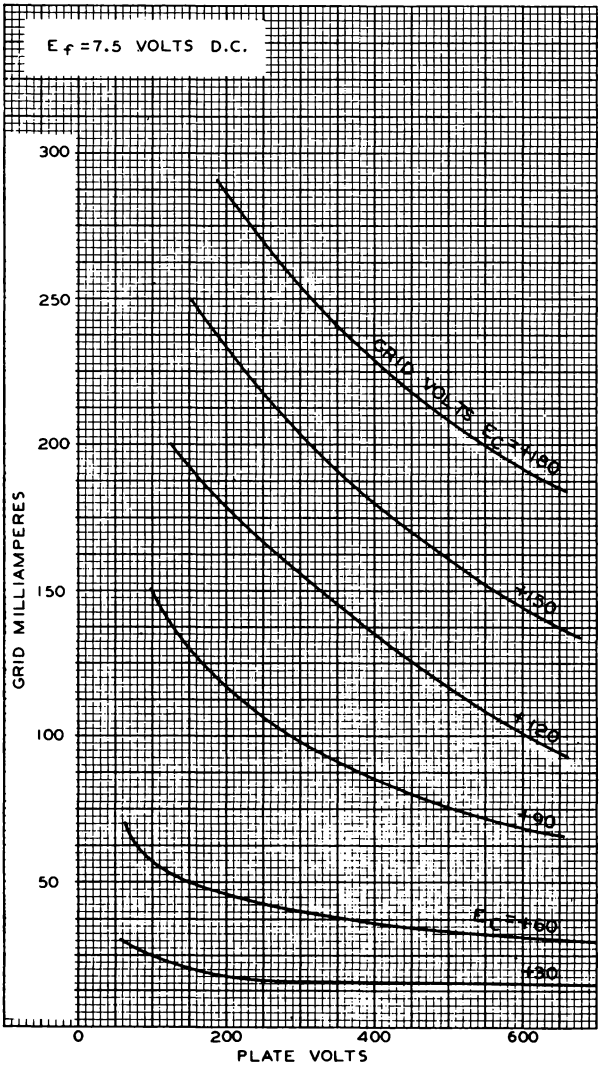
AVERAGE PLATE CHARACTERISTICS



SEPT. 9, 1940 | **TUBE DEPARTMENT** RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY | 92CM-6210

826

TYPICAL CHARACTERISTICS



827-R

TRANSMITTING TETRODE

FORCED-AIR COOLED

Filament	Thoriated Tungsten		
Voltage	7.5	a-c or d-c	volts
Current	25		amp.

Starting - The current must never exceed 50 amperes, even momentarily.

Grid-Screen Mu-Factor	16		
Direct Interelectrode Capacitances:			
Grid-Plate (with external shielding)		0.18 max.	μμf
Input		21	μμf
Output		13	μμf
Maximum Overall Length		5-15/16"	←
Maximum Diameter		4-21/32"	
Radiator		Integral part of tube	

Cooling - vertical air flow of 100 cfm from plate to seal end required for max. plate dissipation rating and max. ambient temperature not more than 45°C. Also, flow of 10 cfm from 1"-diameter nozzle should be directed into header. Air flow must start before any voltages are applied.

MAXIMUM CCS RATINGS and TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

		CCS	
D-C Plate Voltage		3500 max.	volts
D-C Screen Voltage (Grid No.2)		1000 max.	volts
D-C Plate Current		400 max.	ma.
Plate Input		1200 max.	watts
Screen Input		100 max.	watts
Plate Dissipation		800 max.	watts
Radiator Temperature		150 max.	°C
Typical Operation:			
D-C Plate Voltage	3000	3500	volts
D-C Screen Voltage	800	800	volts
D-C Grid Voltage (Grid No.1)*	-75	-75	volts
Peak R-F Grid Voltage	165	150	volts
D-C Plate Current	320	340	ma.
D-C Screen Current	10	12	ma.
D-C Grid Current	30	25 approx.	ma.
Driving Power ●	50	38 approx.	watts
Power Output	350	400 approx.	watts

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

		CCS	
D-C Plate Voltage		3500 max.	volts
D-C Screen Voltage (Grid No.2)		1000 max.	volts
D-C Grid Voltage (Grid No.1)		-500 max.	volts
D-C Plate Current		400 max.	ma.
Plate Input		1200 max.	watts
Screen Input		100 max.	watts
Plate Dissipation		800 max.	watts
Radiator Temperature		150 max.	°C
Typical Operation:			
D-C Plate Voltage.	3000	3500	volts

● See end of tabulation. ← Indicates a change. *With a-c filament supply.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

827-R

827-R

TRANSMITTING TETRODE

(continued from preceding page)

D-C Screen Voltage	800	800	volts
D-C Grid Voltage	-300	-300	volts
Peak R-F Grid Voltage	410	410	volts
Peak A-F Grid Voltage	235	260	volts
D-C Plate Current	333	320	ma.
D-C Screen Current	15	13	ma.
D-C Grid Current	45	40	approx. ma.
Driving Power ●	82	74	approx. watts
Power Output	350	400	approx. watts

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	
D-C Plate Voltage	3000 max.	volts
D-C Screen Voltage (Grid No.2)	800 max.	volts
D-C Grid Voltage (Grid No.1)	-500 max.	volts
D-C Plate Current	400 max.	ma.
D-C Grid Current	125 max.	ma.
Plate Input	1200 max.	watts
Screen Input	100 max.	watts
Plate Dissipation	550 max.	watts
Radiator Temperature	150 max.	°C

Typical Operation:

D-C Plate Voltage	2500	3000	volts
D-C Screen Voltage ◊	700	750	volts
	13000	18000	ohms
D-C Grid Voltage ▲	-350	-325	volts
	2800	2600	ohms
Peak R-F Grid Voltage	640	600	volts
D-C Plate Current	400	400	ma.
D-C Screen Current	140	125	ma.
D-C Grid Current	125	125	approx. ma.
Driving Power	72	68	approx. watts
Power Output	670	825	approx. watts

◊ Obtained preferably from fixed supply modulated simultaneously with plate voltage. Series voltage-dropping resistor (13000, 18000 ohms) connected to modulated plate-voltage supply may also be used.

▲ Obtained by grid resistor of value shown or by combination of grid resistor with either fixed supply or cathode resistor.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

	CCS	
D-C Plate Voltage	3500 max.	volts
D-C Screen Voltage (Grid No.2)	1000 max.	volts
D-C Grid Voltage (Grid No.1)	-500 max.	volts
D-C Plate Current	500 max.	ma.
D-C Grid Current	150 max.	ma.
Plate Input	1500 max.	watts
Screen Input	150 max.	watts
Plate Dissipation	800 max.	watts
Radiator Temperature	150 max.	°C

●, ##: See end of tabulation.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

827-R

TRANSMITTING TETRODE

(continued from preceding page)

Typical Operation:

D-C Plate Voltage	3000	3500	volts
D-C Screen Voltage §	900	700	volts
	12500	15100	ohms
D-C Grid Voltage □	-350	-300	volts
	560	570	ohms
	2800	3000	ohms
Peak R-F Grid Voltage	590	520	volts
D-C Plate Current	500	428	ma.
D-C Screen Current	165	185	ma.
D-C Grid Current	125	100	approx. ma.
Driving Power	66	50	approx. watts
Power Output	1000	1050	approx. watts

● At crest of audio-frequency cycle with modulation factor of 1.0.

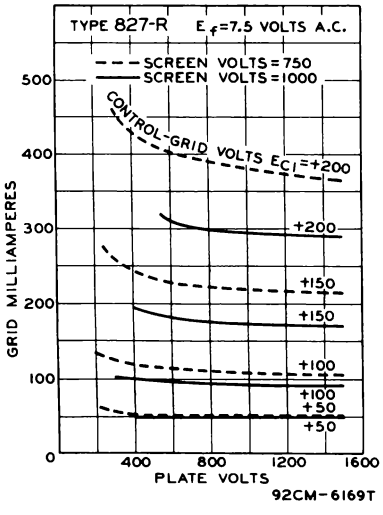
§ Obtained preferably from fixed supply or voltage divider. Screen voltage must not exceed twice the maximum screen-voltage rating under key-up conditions.

□ Obtained from fixed supply, cathode resistor (560, 570) or grid resistor (2800, 3000). If a preceding stage is keyed, sufficient fixed bias must be supplied to maintain plate current at a low value under key-up conditions.

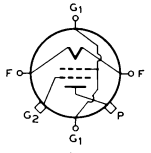
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

Data on operating frequencies for the 827-R are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

TYPICAL CHARACTERISTICS



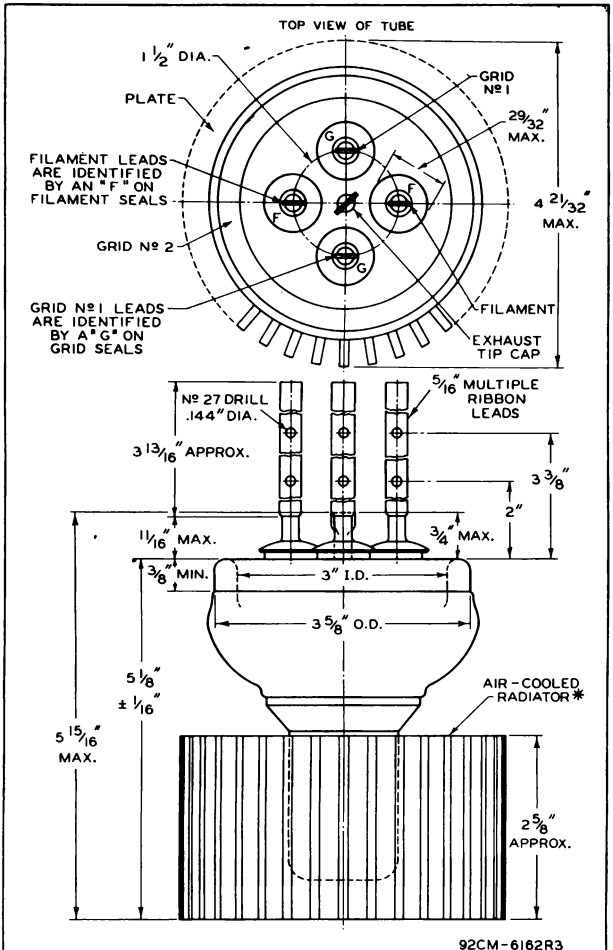
TOP VIEW OF TERMINAL CONNECTIONS



F - Filament
G_1 - Grid No.1
G_2 - Grid No.2
P - Plate

827-R

TRANSMITTING TETRODE



TUBE MOUNTING POSITION

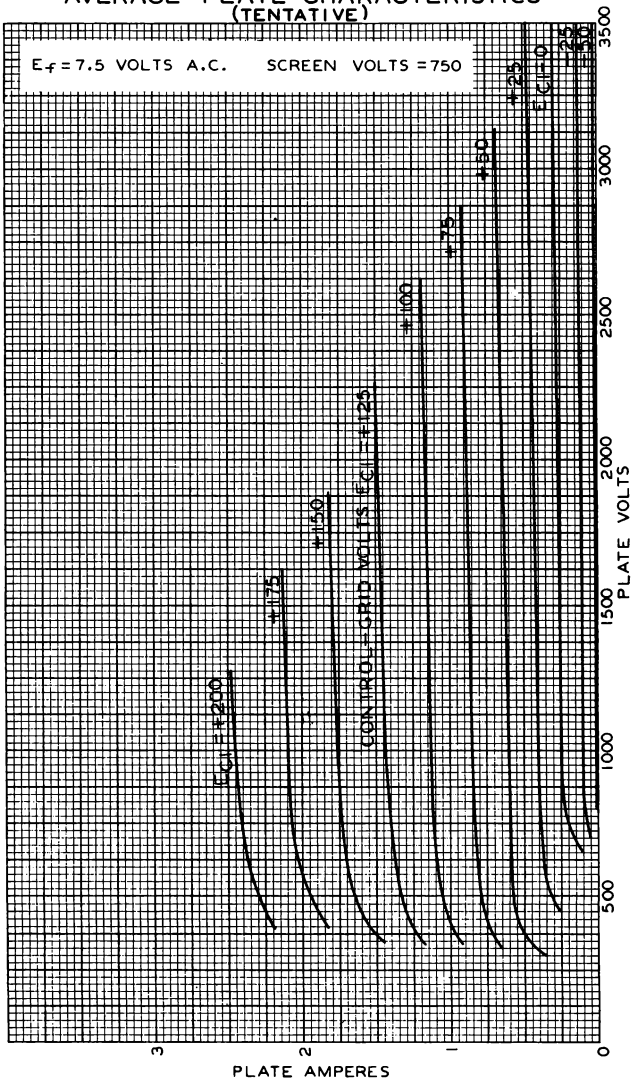
VERTICAL: Radiator down.
HORIZONTAL: No.

* Either open-slot (as shown) or closed-slot type is supplied at our option.

→ Indicates a change.

827-R

827-R
AVERAGE PLATE CHARACTERISTICS
(TENTATIVE)



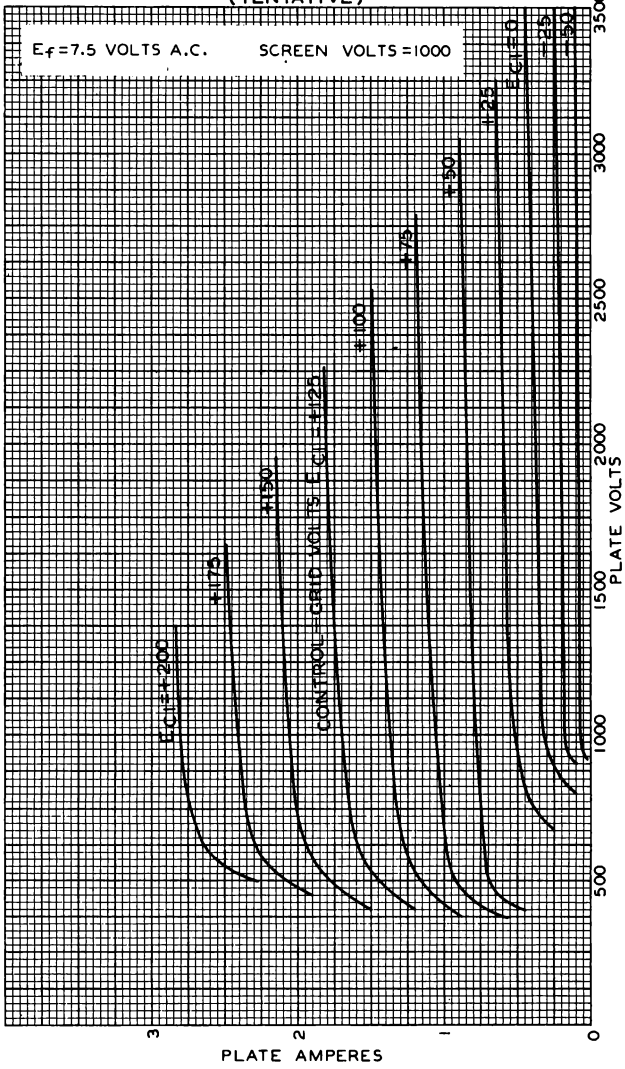
JUNE 5, 1940

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92CM-6167

827-R

827-R
AVERAGE PLATE CHARACTERISTICS
(TENTATIVE)



JUNE 5,1940

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92CM—6166

828
TRANSMITTING BEAM POWER AMPLIFIER

Typical Operation:

	CCS●	ICAS●●	
DC Plate Voltage	1250	1500	volts
DC Grid-No.3 Voltage	75	75	volts
DC Grid-No.2 Voltage■■	400	400	volts
	24300	39300	ohms
DC Grid-No.1 Voltage●#♣	-95	-100	volts
	7900	8300	ohms
	415	430	ohms
Peak RF Grid-No.1 Voltage	195	205	volts
DC Plate Current	160	180	ma
DC Grid-No.3 Current	22	14	ma
DC Grid-No.2 Current	35	28	ma
DC Grid-No.1 Cur. (Approx.)	12	12	ma
Driving Power (Approx.)	2.1	2.2	watts
Power Output (Approx.)	150	200	watts

■ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

■■ Obtained from a separate source, from the plate-voltage supply with a voltage divider, or through a series resistor of value shown. Series grid-No.2 resistor should be used only when the 828 is used as a buffer amplifier and is not keyed. Grid-No.2 voltage must not exceed 800 volts under key-up conditions.

\# Obtained from fixed supply, by grid resistor (7900, 8300) or cathode resistor (415, 430).

♣ If preceding stage is keyed, partial fixed-bias is required.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	3.10	3.40	amp
Grid No.1-Plate Capacitance	-	-	0.07	μμf
Input Capacitance	-	9.9	14.1	μμf
Output Capacitance	-	10.5	17.5	μμf
Plate Current	1,2	30	56	ma
Grid-No.2 Current	1,2	-	7	ma
Grid-No.1 Current	1,3	21	49	ma
Plate Current	1,4	-	10	ma
Power Output	1,5	180	-	watts

Note 1: DC filament volts = 10.0.

Note 2: With dc plate voltage of 1750 volts; dc grid-No.3 voltage of 0 volts; dc grid-No.2 voltage of 300 volts; dc grid-No.1 voltage of -25 volts.

Note 3: With dc plate voltage of 200 volts; dc grid-No.3 voltage of 200 volts; dc grid-No.2 voltage of 200 volts; and dc grid-No.1 voltage of +75 volts.

Note 4: With dc plate voltage of 1750 volts; dc grid-No.3 voltage of -180 volts; dc grid-No.2 voltage of 300 volts; and dc grid-No.1 voltage of -25 volts.

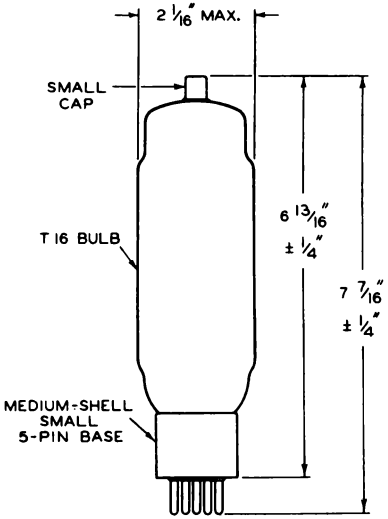
Note 5: With dc plate voltage of 1750 volts; dc grid-No.3 voltage of 100 volts; dc grid-No.2 voltage of 300 volts; plate current of 150 ma; grid-No.1 current of 10 - 15 ma.; grid-No.1 resistor of 10000 ± 10% ohms and frequency of 15 Mc.

●, ●●, ♣: See next page.

828
TRANSMITTING BEAM POWER AMPLIFIER

- Continuous Commercial Service.
- Intermittent Commercial & Amateur Service.
- For ac filament supply.

Data on operating frequencies for the 828 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.



92CM-4547R3

828
TRANSMITTING BEAM POWER AMPLIFIER

	CCS●	ICAS●●	
Driving Power (Approx.)□ . . .	0.5 . .	0.4 . .	watt
Power Output (Approx.)	36 . .	41 . .	watts

● obtained from a source of good regulation or from suitably bypassed cathode resistor.

GRID-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
DC GRID-No.3 (SUPPRESSOR) VOLT.	100 max.	100 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . . .	-300 max.	-300 max.	volts
DC PLATE CURRENT	100 max.	100 max.	ma
PLATE INPUT.	105 max.	120 max.	watts
GRID-No.3 INPUT.	5 max.	5 max.	watts
GRID-No.2 INPUT.	11 max.	11 max.	watts
PLATE DISSIPATION.	70 max.	80 max.	watts

Typical Operation:

DC Plate Voltage	1250 . .	1500 . .	volts
DC Grid-No.3 Voltage	75 . .	75 . .	volts
DC Grid-No.2 Voltage	400 . .	400 . .	volts
DC Grid-No.1 Voltage★★● . . .	-150 . .	-150 . .	volts
Peak RF Grid-No.1 Voltage. . .	165 . .	165 . .	volts
Peak AF Grid-No.1 Voltage. . .	94 . .	94 . .	volts
DC Plate Current	84 . .	80 . .	ma
DC Grid-No.3 Current	4 . .	3.5 . .	ma
DC Grid-No.2 Current	5 . .	4 . .	ma
DC Grid-No.1 Cur. (Approx.). .	1.6 . .	1.3 . .	ma
RF Driving Power (Approx.)□ □□	2.5 . .	2.5 . .	watts
Power Output (Approx.)	36 . .	41 . .	watts

★★ Fixed supply or cathode-resistor bias, unbypassed for audio-frequencies, is recommended.

□ At crest of audio-frequency cycle with a modulation factor of 1.0.

□□ AF driving power is generally never more than 2 watts.

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	1000 max.	1250 max.	volts
DC GRID-No.3 (SUPPRESSOR) VOLT.	100 max.	100 max.	volts

●, ●●, ●: See next page.

828
TRANSMITTING BEAM POWER AMPLIFIER

	CCS●	ICAS●●	
DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . . .	-300 max.	-300 max.	volts
DC PLATE CURRENT	135 max.	160 max.	ma
DC GRID-No.1 CURRENT	15 max.	15 max.	ma
PLATE INPUT.	135 max.	200 max.	watts
GRID-No.3 INPUT.	5 max.	5 max.	watts
GRID-No.2 INPUT.	11 max.	11 max.	watts
PLATE DISSIPATION	47 max.	70 max.	watts

Typical Operation:

DC Plate Voltage	1000 . .	1250 . .	volts
DC Grid-No.3 Voltage	75 . .	75 . .	volts
DC Grid-No.2 Voltage▲▲	400 . .	400 . .	volts
	26000 . .	30000 . .	ohms
DC Grid-No.1 Voltage††● . . .	-140 . .	-140 . .	volts
	14000 . .	11700 . .	ohms
Peak RF Grid-No.1 Voltage. . .	230 . .	250 . .	volts
DC Plate Current	135 . .	160 . .	ma
DC Grid-No.3 Current	13 . .	15 . .	ma
DC Grid-No.2 Current	23 . .	28 . .	ma
DC Grid-No.1 Current (Approx.)	10 . .	12 . .	ma
Driving Power (Approx.) . . .	2.1 . .	2.7 . .	watts
Power Output (Approx.)	100 . .	150 . .	watts

▲▲ obtained preferably from a separate source modulated with the plate supply, or from the modulated plate-supply through a series resistor of the value shown.

†† obtained from a grid resistor of value shown or from a combination of grid resistor with either fixed supply or cathode resistor.

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation■

Maximum Ratings, *Absolute Values:*

	CCS●	ICAS●●	
DC PLATE VOLTAGE.	1250 max.	1500 max.	volts
DC GRID-No.3 (SUPPRESSOR) VOLT.	100 max.	100 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .	-300 max.	-300 max.	volts
DC PLATE CURRENT.	160 max.	180 max.	ma
DC GRID-No.1 CURRENT.	15 max.	15 max.	ma
PLATE INPUT	200 max.	270 max.	watts
GRID-No.3 INPUT	5 max.	5 max.	watts
GRID-No.2 INPUT	16 max.	16 max.	watts
PLATE DISSIPATION	70 max.	80 max.	watts

●,●●,▲,■: See next page.

828
TRANSMITTING BEAM POWER AMPLIFIER

GENERAL DATA

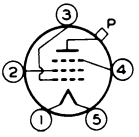
Electrical:

Filament, Thoriated Tungsten:		
Voltage	10 ± 0.5	ac or dc volts
Current	3.25	amp
Transconductance (Approx.) for plate current of 43 ma.	2700	μmhos ←
Direct Interelectrode Capacitances:		←
Grid No.1 to Plate	0.07 max.	μμf
Input	12	μμf
Output	14	μμf

Mechanical:

Mounting Position	Vertical, base down; or Horizontal, pins 2 & 4 in vertical plane.
Overall Length	7-7/16" ± 1/4"
Seated Length	6-13/16" ± 1/4"
Maximum Diameter	2-1/16"
Bulb	T-16
Cap	Small
Base	Medium-Shell Small 5-Pin, Micanol
Basing Designation for BOTTOM VIEW	5J

Pin 1 - Filament
Pin 2 - Grid No.2
Pin 3 - Grid No.1



Pin 4 - Grid No.3
Pin 5 - Filament
Cap - Plate

AF POWER AMPLIFIER & MODULATOR - Class AB_1*

Maximum Ratings, ***Absolute Values:***

	CCS•	ICAS••	
DC PLATE VOLTAGE	1750 max.	2000 max.	volts
DC GRID-No.3 (SUPPRESSOR) VOLT.	100 max.	100 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	750 max.	750 max.	volts
MAX.-SIG. DC PLATE CURRENT*	150 max.	150 max.	ma
MAX.-SIG. PLATE INPUT*	225 max.	270 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT*	16 max.	23 max.	watts
PLATE DISSIPATION*	70 max.	80 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1750	2000	volts ←
DC Grid-No.3 Voltage	60	60	volts
DC Grid-No.2 Voltage †	750	750	volts

* Suscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

* Averaged over any audio-frequency cycle of sine-wave form.

† Zero-signal grid-No.2 voltage must not exceed 775 volts.

•,••: See next page. ← Indicates a change.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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TRANSMITTING BEAM POWER AMPLIFIER

	CCS●	ICAS●●	
DC Grid-No.1 (Control-Grid) Voltage●.	-120	-120	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage.	240	240	volts
Zero-Signal DC Plate Current .	50	50	ma
Max.-Signal DC Plate Current .	248	270	ma
DC Grid-No.3 Current	9	9	ma
Zero-Signal DC Grid-No.2 Current.	4	2	ma
Max.-Signal DC Grid-No.2 Current.	43	60	ma
Effective Load Resistance (Plate-to-plate).	16200	18500	ohms
Max.-Signal Driving Power (Approx.)♦	0	0	watts
Max.-Signal Power Output (Approx.)	300**	385	watts

♦ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the class AB_1 stage. The effective resistance per grid-No.1 circuit of the class AB_1 stage should be held at a low value.

** Distortion only 1% with 20 db of feedback to grid of driver.

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
DC GRID-No.3 (SUPPRESSOR) VOLT.	100 max.	100 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.	400 max.	volts
DC PLATE CURRENT	100 max.	100 max.	ma
PLATE INPUT.	105 max.	120 max.	watts
GRID-No.3 INPUT.	5 max.	5 max.	watts
GRID-No.2 INPUT.	11 max.	11 max.	watts
PLATE DISSIPATION	70 max.	80 max.	watts

Typical Operation:

DC Plate Voltage	1250	1500	volts
DC Grid-No.3 Voltage	75	75	volts
DC Grid-No.2 Voltage	400	400	volts
DC Grid-No.1 (Control-Grid) Voltage●♦	-50	-50	volts
Peak RF Grid-No.1 Voltage. . .	52	50	volts
DC Plate Current	84	80	ma
DC Grid-No.3 Current	4	4	ma
DC Grid-No.2 Current	5	5	ma
DC Grid-No.1 Cur. (Approx.). .	0.3	0.2	ma

●,●●,⊕,♦: See next page.

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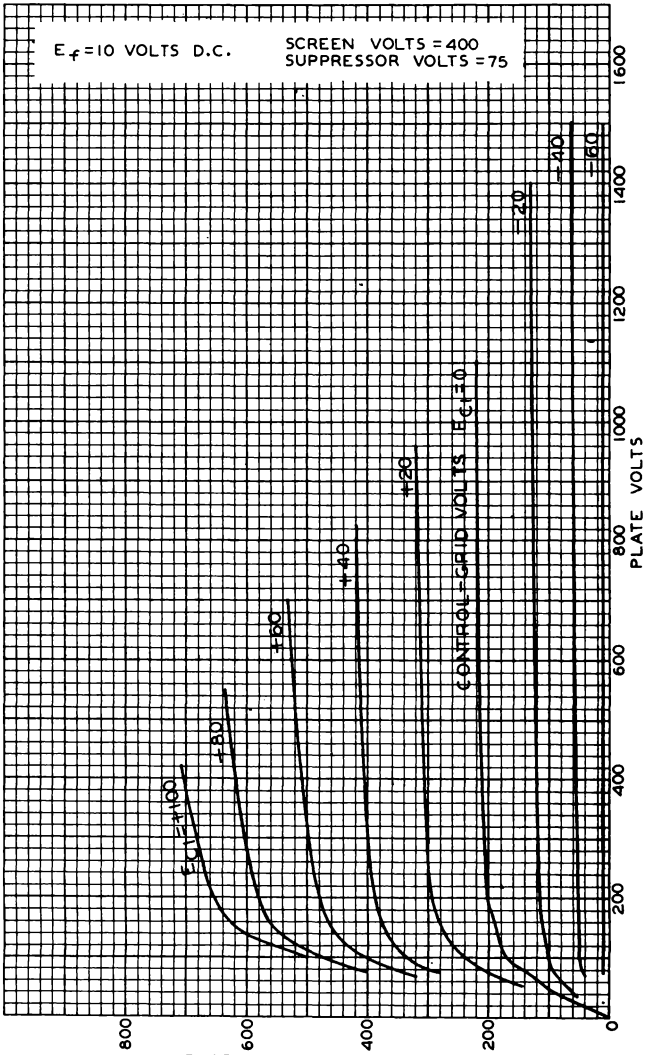
AVERAGE PLATE CHARACTERISTICS



SEPT. 28, 1939

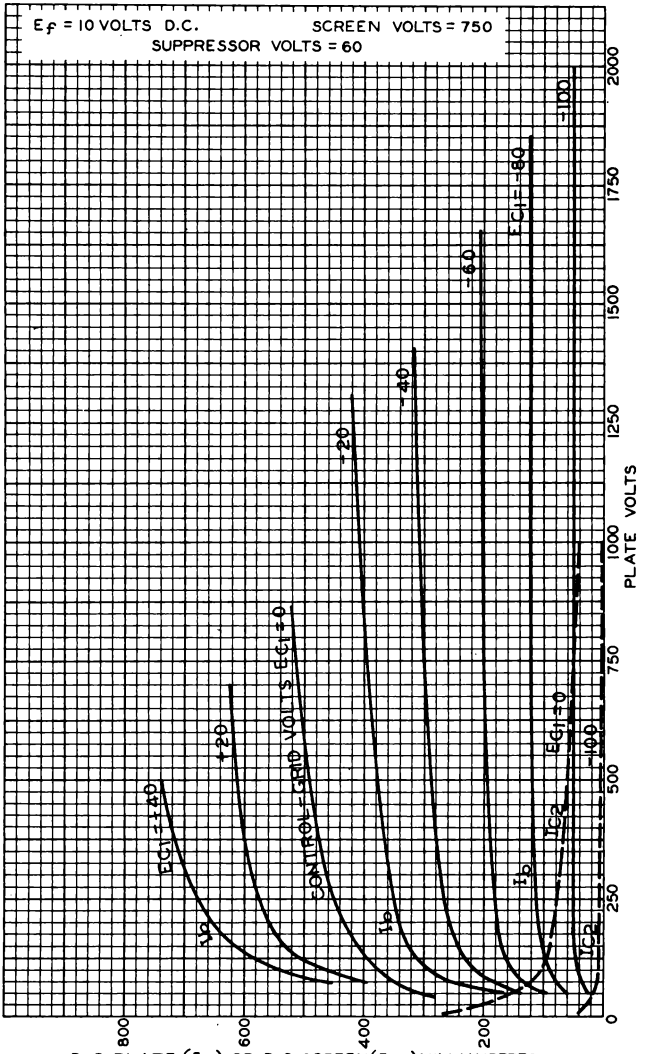
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92CM-6080

828

828

AVERAGE PLATE CHARACTERISTICS



D-C PLATE (I_b) OR D-C SCREEN(I_{c2}) MILLIAMPERES

SEPT. 14, 1939

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92CM-6081

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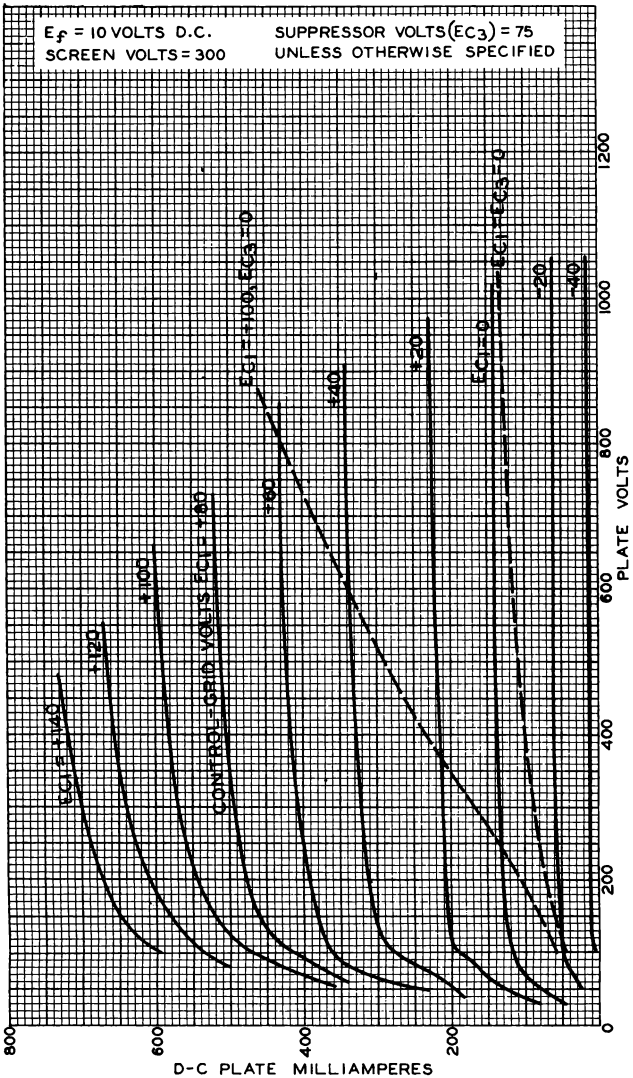
AVERAGE PLATE CHARACTERISTICS



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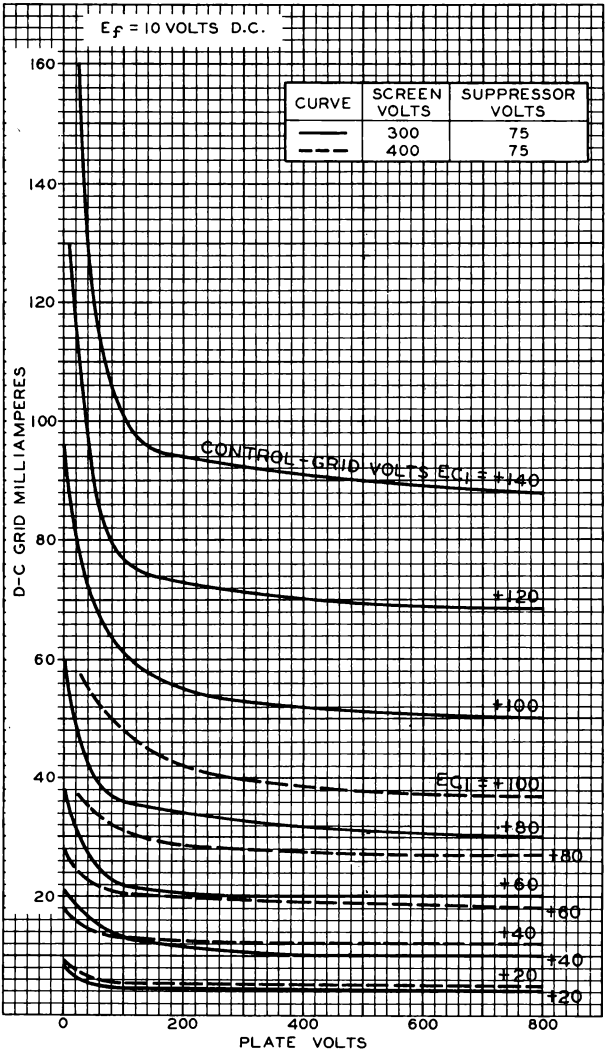
TYPICAL CHARACTERISTICS



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PUSH-PULL RF BEAM POWER AMPLIFIER

Unless Otherwise Specified, Values Are On a Per-Tube Basis

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

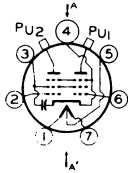
Heater Arrangement	*Series*	*Parallel*	
Voltage	12.6 ± 10%	6.3 ± 10%	ac or dc volts
Current	1.125	2.25	. . . . . amp

Transconductance▲ for dc plate volts = 250, dc grid No.2 volts = 175, and dc plate current = 60 ma	8500	μmhos
Mu-Factor, Grid No.2 to Grid No.1▲ for dc plate volts & dc grid No.2 volts = 225, and dc plate current = 60 ma	9	
Direct Interelectrode Capacitances:▲		
Grid-No.1 to Plate°	0.12 max.	μμf
Input.	14.5	μμf
Output	7.0	μμf
Grid-No.2-to-Cathode Capacitance including internal grid-No.2 bypass capacitor (Approx.)	65	μμf

Mechanical:

Mounting Position	Vertical, base up or down: Horizontal, plane of each plate vertical
Overall Length	4-1/8" ± 3/16"
Seated Length	3-11/16" ± 3/16"
Maximum Diameter	See Outline Drawing
Bulb	T-16
Bulb Terminals	See Outline Drawing
Base . . . . Medium Molded-Flare Septar 7-Pin (JETEC No.E7-2)	
Basing Designation for BOTTOM VIEW	7BP

Pin 1 - Heater
Pin 2 - Grid No.1 of Unit No.2
Pin 3 - Grid No.2
Pin 4 - Cathode, Grid No.3
Pin 5 - Heater Center-Tap



Pin 6 - Grid No.1 of Unit No.1
Pin 7 - Heater

P_{U1} - Plate of Unit No.1
P_{U2} - Plate of Unit No.2

PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

AF POWER AMPLIFIER & MODULATOR - Class AB_1† ←

NATURAL COOLING

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	600 max.	volts

° With external shield up to flange seal.
▲ Each unit.
†,●: See next page. ← Indicates a change.

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PUSH-PULL RF BEAM POWER AMPLIFIER

DC GRID-No.2 (SCREEN) VOLTAGE	225 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	250 max.	ma
MAX.-SIGNAL PLATE INPUT*	100 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT*	7 max.	watts
PLATE DISSIPATION*	30 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
BULB TEMPERATURE	235 max.	°C

Typical Operation:

DC Plate Voltage	600	volts
DC Grid-No.2 Voltage††	200	volts
DC Grid-No.1 Voltage■	-18	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	36	volts
Zero-Signal DC Plate Current	40	ma
Max.-Signal DC Plate Current	100	ma
Zero-Signal DC Grid-No.2 Current	4	ma
Max.-Signal DC Grid-No.2 Current	18	ma
Effective Load Resistance (Plate-to-plate)	13750	ohms
Max. Signal Driving Power	0	watt
Max. Signal Power Output	44	watts

PLATE-MODULATED PUSH-PULL RF POWER AMP. - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

NATURAL COOLING

Maximum Ratings, *Absolute Values:*

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	600 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLT.	225 max.	225 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-175 max.	-175 max.	volts
DC PLATE CURRENT	212 max.	212 max.	ma
DC GRID-No.1 CURRENT	15 max.	15 max.	ma
PLATE INPUT	67.5 max.	90 max.	watts
GRID-No.2 INPUT	7 max.	7 max.	watts

† Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

* Averaged over any audio-frequency cycle of sine-wave form.

■ The type of input-coupling network used should not introduce too much resistance in the grid-No.1 circuit. Transformer or impedance coupling devices are recommended. When grid No.1 is operated in the negative region with fixed bias, the dc grid-No.1-circuit resistance should not exceed 100000 ohms. Cathode-bias is not recommended.

†† Preferably obtained from a separate source, or from the plate-voltage supply with a voltage divider.

●,●●: See next page.

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PUSH-PULL RF BEAM POWER AMPLIFIER

	CCS●	ICAS●●	
PLATE DISSIPATION.	21 max.	28 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	100 max.	100 max.	volts
Heater positive with respect to cathode.	100 max.	100 max.	volts
BULB TEMPERATURE	235 max.	235 max.	°C ←

Typical Operation with Natural Cooling:

DC Plate Voltage	600	425	600	volts
DC Grid-No.2 Voltage# . . .	200	200	200	volts
	15500	6400	13300	ohms
DC Grid-No.1 Voltage⊕▲▲ . .	-70	-60	-70	volts
	8700	5500	5800	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage . .	160	154	172	volts
DC Plate Current	112	212	150	ma
DC Grid-No.2 Current	26	35	30	ma
DC Grid-No.1 Current (Approx.)	8	11	12	ma
Driving Power (Approx.) . .	0.6	0.8	0.9	watt
Power Output (Approx.) . . .	50	63	70	watts

FORCED-AIR COOLING

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	600 max.	600 max.	volts
DC GRID-No.2 VOLTAGE	225 max.	250 max.	volts
DC GRID-No.1 VOLTAGE	-175 max.	-175 max.	volts
DC PLATE CURRENT	212 max.	240 max.	ma
DC GRID-No.1 CURRENT	15 max.	20 max.	ma
PLATE INPUT.	90 max.	120 max.	watts
GRID-No.2 INPUT.	7 max.	8 max.★	watts
PLATE DISSIPATION.	28 max.	40 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	100 max.	100 max.	volts
Heater positive with respect to cathode.	100 max.	100 max.	volts
BULB TEMPERATURE	235 max.	235 max.	°C ←

Typical Operation with Forced-Air Cooling:

DC Plate Voltage	425	600	600	volts
DC Grid-No.2 Voltage# . . .	200	200	200	volts
	6400	13300	13300	ohms

★ In ICAS applications at frequencies less than 20 MC where duty-factor does not exceed 0.2, maximum "on" period does not exceed 30 seconds, and average modulation factor does not exceed 0.25, maximum grid-No.2 input of 12 watts is permitted.

obtained from a separate source modulated with the plate supply, or from the modulated plate supply through a series resistor of the value shown.

●,●●,⊕,▲▲: See next page. ← Indicates a change

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PUSH-PULL RF BEAM POWER AMPLIFIER

	CCS●		ICAS●●	
DC Grid-No.1 Voltage⊕▲▲ . . .	-60	-70	-80	volts
	5500	5800	5300	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage . .	154	172	210	volts
DC Plate Current	212	150	200	ma
DC Grid-No.2 Current	35	30	30	ma
DC Grid-No.1 Current (Approx.)	11	12	15	ma
Driving Power (Approx.). . .	0.8	0.9	1.4	watts
Power Output (Approx.) . . .	63	70	85	watts

PUSH-PULL RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

NATURAL COOLING

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	750 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	225 max.	225 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . .	-175 max.	-175 max.	volts
DC PLATE CURRENT	240 max.	240 max.	ma
DC GRID-No.1 CURRENT	15 max.	15 max.	ma
PLATE INPUT.	90 max.	120 max.	watts
GRID-No.2 INPUT.	7 max.	7 max.	watts
PLATE DISSIPATION.	30 max.	40 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	100 max.	100 max.	volts
Heater positive with respect to cathode.	100 max.	100 max.	volts
→ BULB TEMPERATURE	265 max.	265 max.	°C

Typical Operation with Natural Cooling:

DC Plate Voltage	750	500	750	volts
DC Grid-No.2 Voltage★★ . . .	200	200	200	volts
	16200	9300	18300	ohms
DC Grid-No.1 Voltage⊕♦ . . .	-50	-45	-55	volts
	6300	3750	4600	ohms
	310	160	270	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage . .	120	124	140	volts

▲▲ Obtained from a grid resistor of value shown (per tube) or by partial self-bias methods.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●,●●,⊕,★★,♦: See next page. → Indicates a change.

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PUSH-PULL RF BEAM POWER AMPLIFIER

	CCS●	ICAS●●		
DC Plate Current	120	240	160	ma
DC Grid-No.2 Current	34	32	30	ma
DC Grid-No.1 Current (Approx.)	8	12	12	ma
Driving Power (Approx.)	0.45	0.7	0.8	watt
Power Output (Approx.)	65	83	87	watts

FORCED-AIR COOLING

Maximum Ratings, *Absolute Values:*

	CCS●	ICAS●●	
DC PLATE VOLTAGE	750 max.	750 max.	volts
DC GRID-No.2 VOLTAGE	225 max.	250 max.	volts
DC GRID-No.1 VOLTAGE	-175 max.	-175 max.	volts
DC PLATE CURRENT	240 max.	240 max.	ma
DC GRID-No.1 CURRENT	15 max.	20 max.	ma
PLATE INPUT	120 max.	150 max.	watts
GRID-No.2 INPUT	7 max.	8 max.	watts
PLATE DISSIPATION	40 max.	45 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	100 max.	100 max.	volts
Heater positive with respect to cathode.	100 max.	100 max.	volts
BULB TEMPERATURE	235 max.	235 max.	°C ←

Typical Operation with Forced-Air Cooling:

DC Plate Voltage	500	750	750	volts
DC Grid-No.2 Voltage**	200	200	200	volts
	9300	18300	16200	ohms
DC Grid-No.1 Voltage⊕♦	-45	-55	-50	volts
	3750	4600	3100	ohms
	160	270	200	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage	124	140	150	volts
DC Plate Current	240	160	200	ma
DC Grid-No.2 Current	32	30	34	ma
DC Grid-No.1 Current (Approx.)	12	12	16	ma
Driving Power (Approx.)	0.7	0.8	1.1	watts
Power Output (Approx.)	83	87	110	watts

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

⊕ The grid-circuit resistance should never exceed 15000 ohms (total) per tube; or 30000 ohms per unit. Any additional bias required must be supplied by a cathode resistor or a fixed supply.

** Obtained from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of value shown. The grid-No.2 voltage must not exceed 600 volts under key-up conditions.

♦ Obtained from a fixed supply, or a grid resistor (3750,4600,3100) or cathode resistor (160,270,200) or by combination methods.

← Indicates a change.

829-B

PUSH-PULL RF BEAM POWER AMPLIFIER

SHIELDING and BYPASSING

Shielding of the 829-B in an rf amplifier is required for stable operation. A convenient method of shielding is to mount the tube with one end through a hole in a metal plate so that the edge of the hole is close to the internal shield of the tube. Due to the importance, at the very-high frequencies, of obtaining the shortest leads possible, rf bypassing must be accomplished close to the tube terminals. Ribbon leads acting as plates of the bypass capacitors are effective. All circuit returns should be made to the common cathode connection. RF chokes may be advisable in the voltage-supply leads.

Data on operating frequencies for the 829-B are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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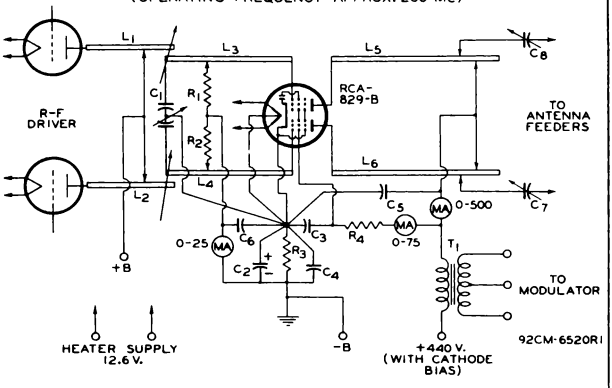
PUSH-PULL RF BEAM POWER AMPLIFIER

VHF PLATE-MODULATED PUSH-PULL R-F POWER AMPLIFIER
(OPERATING FREQUENCY APPROX. 200 Mc)



C_1 = 1.2 to 10 $\mu\mu f$ per section
C_2 = 25 μf, 200 Volts
C_3 C_4 C_5 C_6 = 500 $\mu\mu f$, Mica
C_7 C_8 = 3 to 35 $\mu\mu f$
R_1 R_2 = 7500 to 15000 Ohms, 1 Watt
R_3 = 60 Ohms, 10 Watts
R_4 = 6400 Ohms, 15 Watts
T_1 = Modulation Transformer

L_1 L_2 = Dimensions dependent on type of driver tube; Approx. same as L_5 L_6

L_3 L_4 = 1/4" Dia. copper tubing, approx. 10" long and spaced approx. 7/8" between centers.

L_5 L_6 = 3/8" Dia. copper tubing, approx. 7" long and spaced approx. 7/8" between centers.

Note 1: Adjust coupling of L_1L_2 and L_3L_4 for optimum grid excitation.

Note 2: Grid resistors should be adjusted on L_3L_4 at voltage node.

Devices and arrangements shown or described herein may use patents of RCA or others. Information contained herein is furnished without responsibility by RCA for its use and without prejudice to RCA's patent rights.

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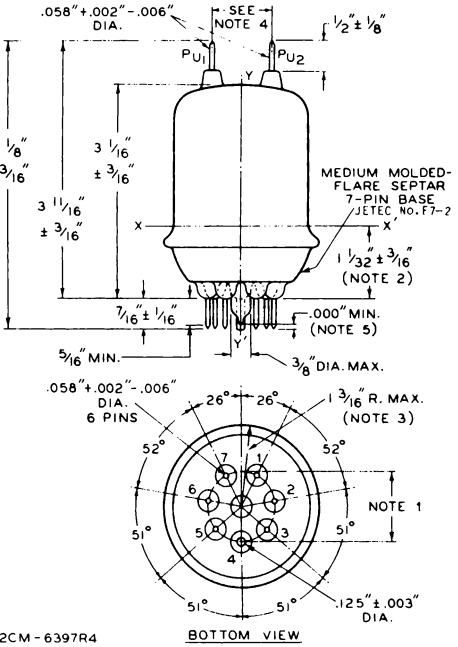
PUSH-PULL RF BEAM POWER AMPLIFIER



THE REFERENCE AXIS YY' IS DEFINED AS THE AXIS OF THE BASE-PIN GAUGE DESCRIBED IN NOTE 1.

NOTE 1: ANGULAR VARIATIONS BETWEEN PINS AND VARIATION IN PIN-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT PINS WILL ENTER TO A DISTANCE OF 0.375" A FLAT-PLATE BASE-PIN GAUGE HAVING SIX HOLES 0.0800" ± 0.0005" AND ONE HOLE 0.1450" ± 0.0005" ARRANGED ON A 1.0000" ± 0.0005" CIRCLE AT SPECIFIED ANGLES WITH TOLERANCE OF ± 5' FOR EACH ANGLE. GAUGE IS ALSO PROVIDED WITH A HOLE 0.500" ± 0.010" CONCENTRIC WITH PIN CIRCLE WHOSE CENTER IS ON THE AXIS YY'.

NOTE 2: A FLAT-PLATE FLANGE GAUGE WITH HOLE 2.063" - 0.000" + 0.003" IS LOWERED OVER TUBE SEATED IN BASE-PIN GAUGE SO THAT THE HOLE AXIS IS COINCIDENT WITH AXIS YY' WITHIN 0.150", AND SO THAT THE BOTTOM SURFACE OF THE

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PUSH-PULL RF BEAM POWER AMPLIFIER

FLANGE GAUGE IS PARALLEL TO THE TOP SURFACE OF THE BASE-PIN GAUGE, AND UNTIL THE FLANGE GAUGE RESTS ON THE TUBE-FLANGE SEAL AT POSITION XX'. THE PERPENDICULAR DISTANCE BETWEEN THE TWO GAUGES WILL BE AS SHOWN.

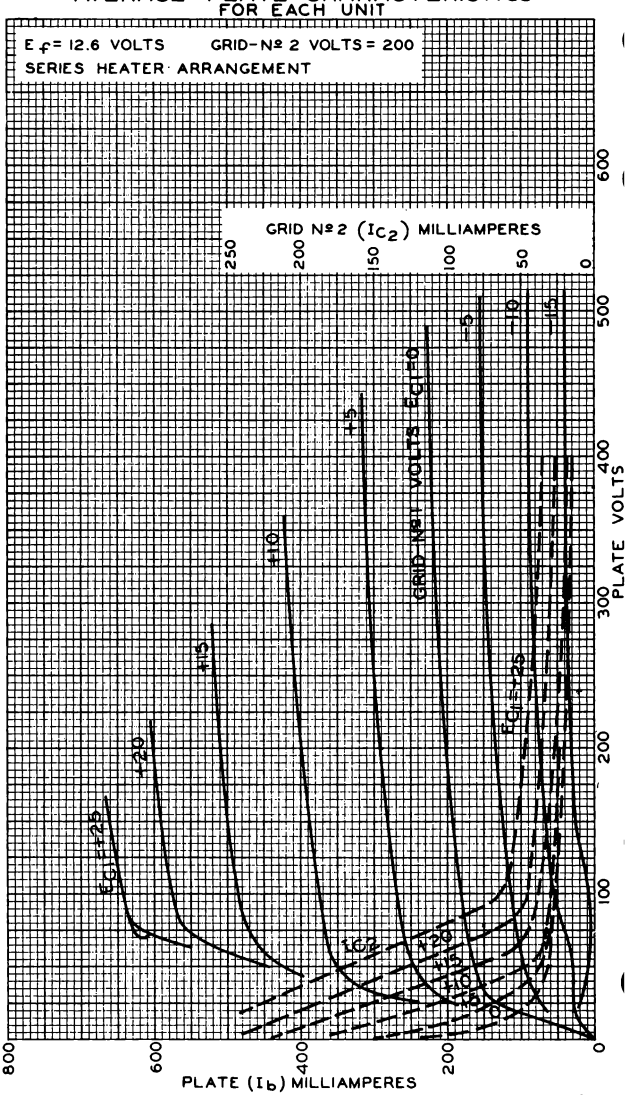
NOTE 3: MINIMUM DIAMETER OF TUBE-SEAL FLANGE WILL BE SUCH THAT A RING GAUGE HAVING I.D. OF 2.125" - 0.000" + 0.003" AND THICKNESS OF 0.125" ± 0.010" WILL NOT PASS THE FLANGE WHEN TRIED AT ANY ANGLE.

NOTE 4: THE PLATE LEADS WILL ENTER A FLAT-PLATE PLATE-LEAD GAUGE HAVING MINIMUM THICKNESS OF 0.375" AND HAVING TWO HOLES 0.1200" ± 0.0005" WHOSE CENTERS ARE LOCATED AT A DISTANCE OF 0.424" ± 0.001" FROM THE AXIS YY' AND WHOSE AXES ARE PARALLEL TO YY'. THE PLANE THROUGH THESE AXES WILL BE 90° ± 5' FROM THE PLANE THROUGH YY' AND PIN No.4.

NOTE 5: EXHAUST TIP WILL NOT EXTEND BEYOND THE PLANE WHICH PASSES THROUGH THE ENDS OF THE THREE LONGEST PINS.

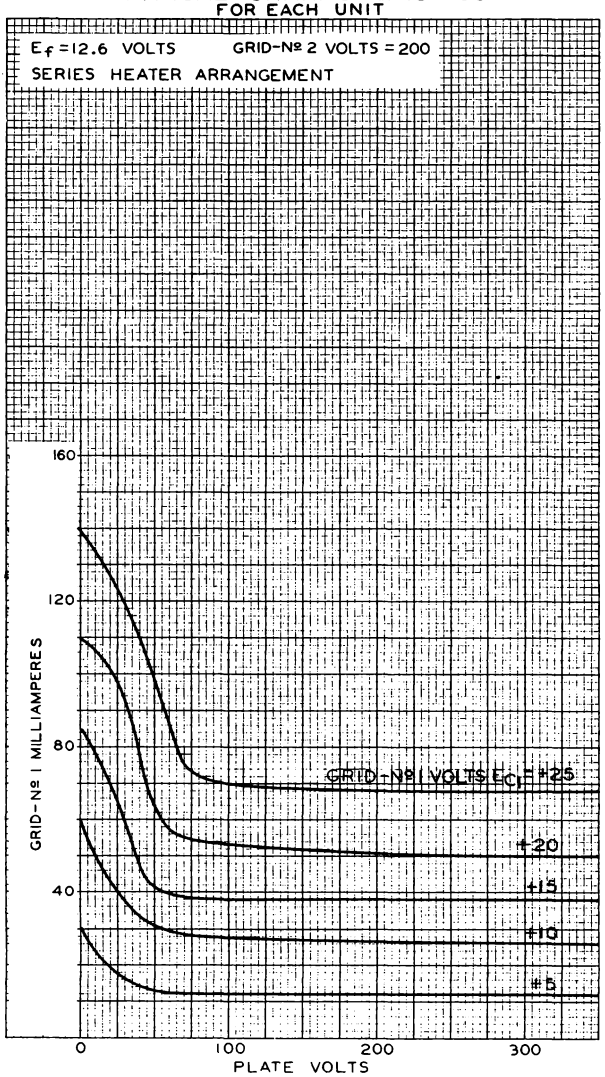
829-B

AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



829-B

TYPICAL CHARACTERISTICS
FOR EACH UNIT



830-B

R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	2	amp.
Amplification Factor	25	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	11	μμf
Grid to Filament	5	μμf
Plate to Filament	1.8	μμf
Maximum Overall Length		6-11/16"
Maximum Diameter		2-1/16"
Cap		Small Metal
Base		Medium 4-Pin Bayonet

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage		1000 max.	volts
Max-Signal D-C Plate Current*		150 max.	ma.
Max-Signal Plate Input*		150 max.	watts
Plate Dissipation*		60 max.	watts
Typical Operation - 2 tubes:			
Unless otherwise specified, values are for 2 tubes.			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	800	1000	volts
D-C Grid Voltage	-27	-35	volts
Peak A-F Grid-to-Grid Voltage	250	270	volts
Zero-Signal D-C Plate Current	20	20	ma.
Max-Signal D-C Plate Current	280	280	ma.
Load Resistance (per tube)	1500	1900	ohms
Effective Load Res. (plate to plate)	6000	7600	ohms
Max-Signal Driving Power	5	6	approx. watts
Max-Signal Power Output	135	175	approx. watts

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		1000 max.	volts
D-C Plate Current		100 max.	ma.
Plate Input		90 max.	watts
Plate Dissipation		60 max.	watts
Typical Operation:			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	800	1000	volts
D-C Grid Voltage	-27	-35	volts
Peak R-F Grid Voltage	85	85	volts
D-C Plate Current	95	85	ma.
D-C Grid Current**	7	6	approx. ma.
Driving Power** °	9	6	approx. watts
Power Output	23	26	approx. watts

*, **, ° See next page.

(continued on next page)

830-B
R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			800 max.	volts
D-C Grid Voltage			-300 max.	volts
D-C Plate Current			100 max.	ma.
D-C Grid Current			30 max.	ma.
Plate Input			80 max.	watts
Plate Dissipation			40 max.	watts
Typical Operation:				
Filament Voltage	10	10	a-c	volts
D-C Plate Voltage	600	800		volts
D-C Grid Voltage	-140	-150		volts
Peak R-F Grid Voltage	255	265		volts
D-C Plate Current	95	95		ma.
D-C Grid Current **	30	20	approx.	ma.
Driving Power **	7	5	approx.	watts
Power Output	38	50	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage			1000 max.	volts
D-C Grid Voltage			-300 max.	volts
D-C Plate Current			150 max.	ma.
D-C Grid Current			30 max.	ma.
Plate Input			150 max.	watts
Plate Dissipation			60 max.	watts
Typical Operation:				
Filament Voltage	10	10	10	a-c volts
D-C Plate Voltage	600	800	1000	volts
D-C Grid Voltage	-95	-105	-110	volts
Peak R-F Grid Voltage	235	245	250	volts
D-C Plate Current	140	140	140	ma.
D-C Grid Current **	30	30	30	approx. ma.
Driving Power **	7	7	7	approx. watts
Power Output	45	70	90	approx. watts

* Averaged over any audio-frequency cycle.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

° At crest of a-f cycle with modulation factor of 1.0.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

For operation of the 830-B at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

(continued on next page)

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

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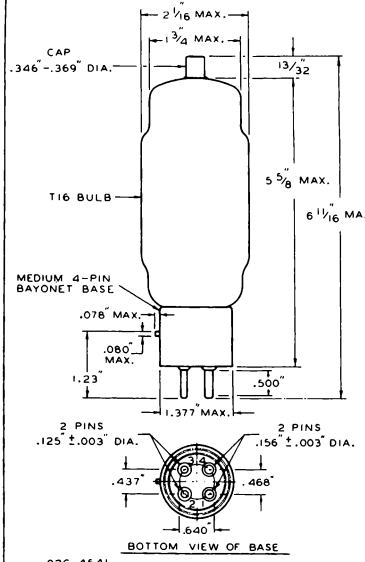
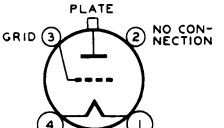
R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(continued from preceding page)

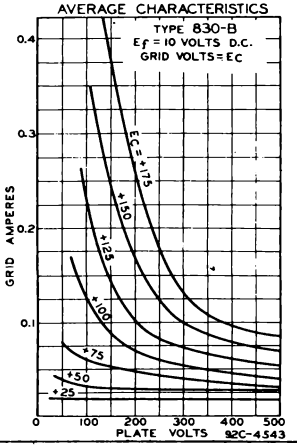


92C-4541

TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



AVERAGE CHARACTERISTICS



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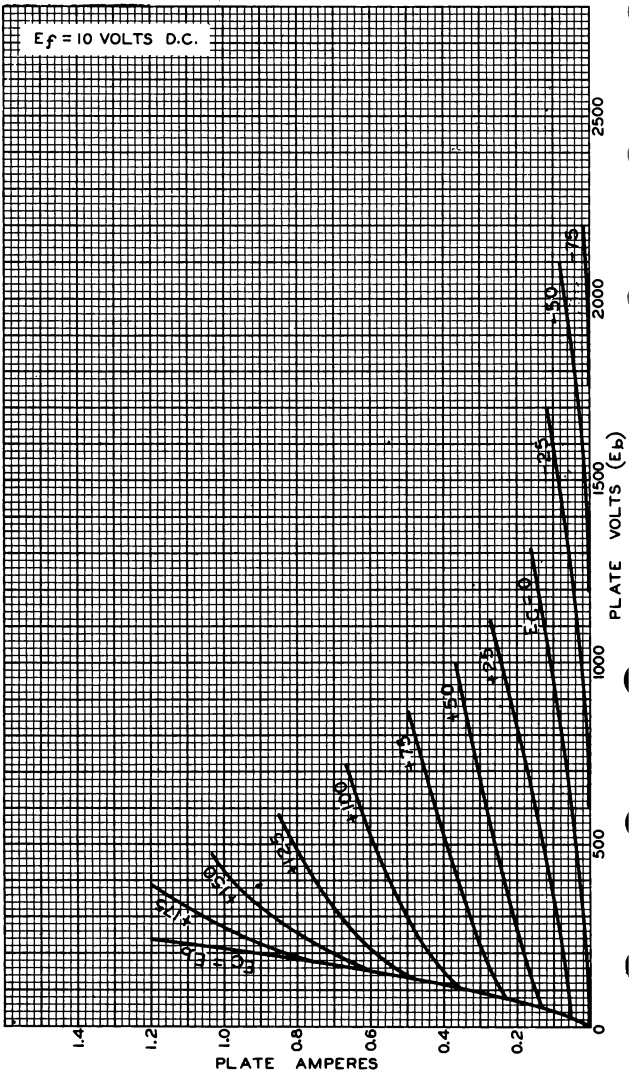
AVERAGE PLATE CHARACTERISTICS



JAN. 17, 1936

RCA RADIOTRON DIVISION
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PUSH-PULL RF BEAM POWER AMPLIFIER

UNLESS OTHERWISE SPECIFIED, VALUES ARE ON A PER-TUBE BASIS

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Heater Arrangement	*Series*	*Parallel*	
Voltage.	12.6 ± 10%	6.3 ± 10%	ac or dc volts
Current.	0.8	1.6	amp

Transconductance (Approx., each unit)
For grid-No.2 volts = 135 and plate ma. = 30. . . 3500 μmhos

Mu-Factor, Grid No.2 to Grid No.1 ←
(Approx., each unit)
For grid-No.2 volts = 250 and plate ma. = 30 . . . 6.5

Direct Interelectrode Capacitances (Each Unit): ←

Grid-No.1 to Plate°	0.07 max.	μμf
Input.	8.0 . . .	μμf
Output	3.8 . . .	μμf
Grid-No.2-to-Cathode Capacitance including internal grid-No.2 bypass capacitor (Approx.)	65 . . .	μμf

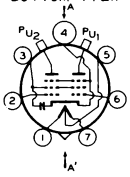
° With external shield in plane of seal flange.

Mechanical:

Mounting Position.	Any
Overall Length	3-3/16" ± 1/8"
Seated Length.	2-3/4" ± 1/8"
Maximum Diameter	See Outline Drawing
Bulb Terminals	See Outline Drawing

Base . . . . Medium Molded-Flare Septar 7-Pin (JETEC No.E7-2)
Basing Designation for BOTTOM VIEW 7BP

Pin 1 - Heater
Pin 2 - Grid No.1 of Unit No.2
Pin 3 - Grid No.2
Pin 4 - Cathode, Grid No.3
Pin 5 - Heater Center-Tap



Pin 6 - Grid No.1 of Unit No.1
Pin 7 - Heater

P_{U1} - Plate of Unit No.1
P_{U2} - Plate of Unit No.2

PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

Bulb Temperature (At hottest point). . . . . 200 max. °C ←

PLATE-MODULATED PUSH-PULL RF POWER AMP. - Class C Telephony

Carrier conditions per tube for use with a max.modulation factor of 1.0

Maximum Ratings, ***Absolute Values:*** ←

	CCS•	*ICAS*••	
DC PLATE VOLTAGE	600 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE. .	250 max.	250 max.	volts

•, ••: See next page. ← Indicates a change.

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PUSH-PULL RF BEAM POWER AMPLIFIER

	CCS●	ICAS●●	
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. .	-175 max.	-175 max.	volts
DC PLATE CURRENT.	75 max.	95 max.	ma
DC GRID-No.1 CURRENT.	6 max.	6 max.	ma
PLATE INPUT	22 max.	36 max.	watts
GRID-No.2 INPUT	3.4 max.	5 max.	watts
PLATE DISSIPATION	10 max.	15 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	100 max.	100 max.	volts
Heater positive with respect to cathode.	100 max.	100 max.	volts

→ **Typical Operation**

DC Plate Voltage.	425	600	600	volts
DC Grid-No.2 Voltage# . . .	200	200	200	volts
From series resistor of .	14000	25000	20000	ohms
DC Grid-No.1 Voltage●▲▲ . .	-60	-65	-70	volts
From grid resistor of . .	25000	25000	23000	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage .	140	150	160	volts
DC Plate Current.	52	36	60	ma
DC Grid-No.2 Current. . . .	16	16	20	ma
DC Grid-No.1 Cur. (Approx.)	2.4	2.6	3.0	ma
Driving Power (Approx.) . .	0.15	0.18	0.21	watt
Power Output (Approx.). . .	16	17	26	watts

PUSH-PULL RF POWER AMPLIFIER & OSCILLATOR-Class C Telegraphy

Key-down conditions per tube without modulation□□

→ **Maximum Ratings,** *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE.	750 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. .	-175 max.	-175 max.	volts
DC PLATE CURRENT.	90 max.	115 max.	ma
DC GRID-No.1 CURRENT.	6 max.	6 max.	ma
PLATE INPUT	36 max.	50 max.	watts
GRID-No.2 INPUT	5 max.	5 max.	watts
PLATE DISSIPATION	15 max.	20 max.	watts

\# Obtained from a separate source modulated with the plate supply, or from the modulated plate supply through a series resistor of the value shown.

▲▲ Obtained from a grid resistor of value shown (per tube) or by partial self-bias methods.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●, ●●, ⊕: See next page. → Indicates a change.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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PUSH-PULL RF BEAM POWER AMPLIFIER

	CCS●		ICAS●●	
PEAK HEATER-CATHODE VOLTAGE:				
Heater negative with respect to cathode . .	100 max.		100 max.	volts
Heater positive with respect to cathode . .	100 max.		100 max.	volts
Typical Operation:				
DC Plate Voltage	500	750	750	volts
DC Grid-No.2 Voltage★★ . . .	200	200	200	volts
From series resistor of. .	21000	37000	25000	ohms
DC Grid-No.1 Voltage⊕. . . .	-65	-65	-50	volts
From grid resistor of. . .	25000	23000	12500	ohms
From cathode resistor of .	730	1000	550	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage . .	150	150	130	volts
DC Plate Current	72	48	65	ma
DC Grid-No.2 Current	14	15	22	ma
DC Grid-No.1 Current (Approx.)	2.6	2.8	4.0	ma
Driving Power (Approx.). . .	0.18	0.19	0.24	watt
Power Output (Approx.) . . .	26	26	35	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current (Each section).	1	0.76	0.84	amp
Grid No.1—Plate Capacitance (Each unit).	2	–	0.07	μμf
Input (Each unit).	–	6.6	9.4	μμf
Output (Each unit)	–	2.8	4.8	μμf
Plate Current (Each unit). . .	3	18	42	ma
Grid-No.2 Current (Each unit).	3	0.1	5.5	ma
Positive Grid-No.1 Current (Each unit).	4	8	52	ma
Useful Power Output (Per tube)	5	14	–	watts

Note 1: With 6.3 volts on heater section under test.

Note 2: With external shield in plane of seal flange.

Note 3: With 6.3 volts on heater sections in parallel, dc plate voltage of 250 volts on unit under test, dc grid-No.2 voltage of 135 volts, dc grid-No.1 voltage of -10 volts on unit under test, and dc grid-No.1 voltage of -100 volts on unit not under test.

Note 4: With 6.3 volts on heater sections in parallel, dc plate voltage of 90 volts on unit under test, dc grid-No.2 voltage of 90 volts, dc grid-No.1 voltage of +20 volts on unit under test, and dc grid-No.1 voltage of -100 volts on unit not under test.

Note 5: In a push-pull self-excited oscillator circuit with 11 volts on heater sections in series, dc plate voltage of 400 volts on each unit, max. dc grid-No.2 voltage of 250 volts, total dc plate current of 90 ma., total dc grid-No.1 current of 2 to 6 ma., grid-No.1 resistor of 8000 to 18000 ohms, and frequency of 200 megacycles per second.

●,●●,⊕,★★: See next page. ← Indicates a change.

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832-A

PUSH-PULL RF BEAM POWER AMPLIFIER

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

⊕ The grid-circuit resistance should never exceed 25000 ohms (total) per tube; or 50000 ohms per unit. Any additional bias required must be supplied by a cathode resistor or a fixed supply.

★★ Obtained from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of value shown. The grid-No.2 voltage must not exceed 600 volts under key-up conditions.

Data on operating frequencies for the 832-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

OPERATING NOTES

Shielding of the 832-A in an rf amplifier is required for stable operation. A convenient method of shielding is to mount the tube with one end through a hole in a metal plate so that the edge of the hole is close to the internal shield of the tube. Due to the importance, at the ultra-high frequencies, of obtaining the shortest leads possible, rf bypassing must be accomplished close to the tube terminals. Ribbon leads acting as plates of the bypassing capacitors are effective. All circuit returns should be made to the common cathode connection. Rf chokes may be advisable in the voltage-supply leads.

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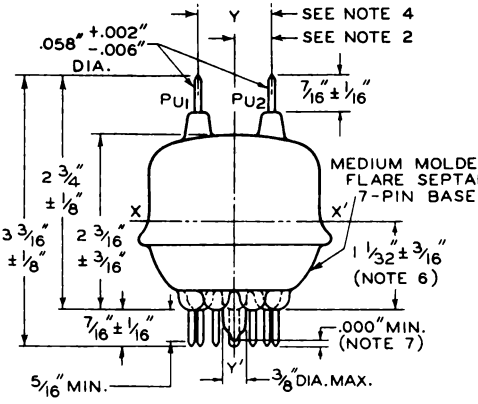
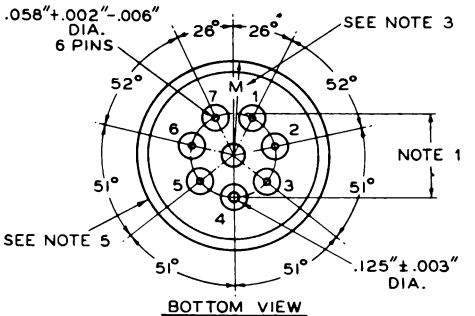
PUSH-PULL RF BEAM POWER AMPLIFIER





BOTTOM VIEW

THE REFERENCE AXIS YY' IS DEFINED AS THE AXIS OF THE BASE-PIN GAUGE DESCRIBED IN NOTE 1

92CM-6374R3

NOTE 1: ANGULAR VARIATIONS BETWEEN PINS AND VARIATION IN PIN-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT PINS WILL ENTER TO A DISTANCE OF 0.375" A FLAT-PLATE BASE-PIN GAUGE HAVING SIX HOLES 0.0800" ± 0.0005" AND ONE HOLE 0.1450" ± 0.0005" ARRANGED ON A 1.0000" ± 0.0005" CIRCLE AT SPECIFIED ANGLES WITH TOLERANCE OF ± 5' FOR EACH ANGLE. GAUGE IS ALSO PROVIDED WITH A HOLE 0.500" ± 0.010" CONCENTRIC WITH PIN CIRCLE WHOSE CENTER IS ON THE AXIS YY'.

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PUSH-PULL RF BEAM POWER AMPLIFIER

NOTE 2: THE PLATE LEADS WILL ENTER A FLAT-PLATE PLATE-LEAD GAUGE HAVING MINIMUM THICKNESS OF 0.375" AND HAVING TWO HOLES 0.2000" ± 0.0005" WHOSE CENTERS ARE LOCATED AT A DISTANCE OF 0.424" ± 0.001" FROM THE AXIS YY' AND WHOSE AXES ARE PARALLEL TO YY'. THE PLANE THROUGH THESE AXES WILL BE 90° ± 5' FROM THE PLANE THROUGH YY' AND PIN No.4.

NOTE 3: WHEN THE TUBE IS SEATED IN THE BASE-PIN GAUGE AND CONSTRAINED BY THE PLATE-LEAD GAUGE OF NOTE 2, THE MAXIMUM RADIUS 'M' IS DETERMINED BY LOWERING OVER THE TUBE A CYLINDER GAUGE HAVING A RADIUS OF 1.156" + 0.000" - 0.003" WHOSE AXIS IS COINCIDENT WITH THE YY' AXIS.

NOTE 4: THE PLATE LEADS WILL ENTER A FLAT-PLATE PLATE-LEAD GAUGE HAVING MINIMUM THICKNESS OF 0.375" AND HAVING TWO HOLES 0.2000" ± 0.0005" WHOSE CENTERS ARE SPACED 0.848" ± 0.001" FROM EACH OTHER.

NOTE 5: MINIMUM DIAMETER OF TUBE-SEAL FLANGE WILL BE SUCH THAT A RING GAUGE HAVING I.D. OF 2.125" - 0.000" + 0.003" AND THICKNESS OF 0.125" ± 0.010" WILL NOT PASS THE FLANGE WHEN TRIED AT ANY ANGLE.

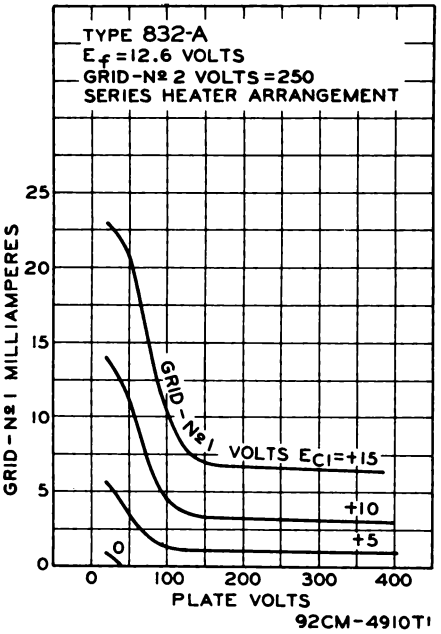
NOTE 6: A FLAT-PLATE FLANGE GAUGE WITH HOLE 2.063" - 0.000" + 0.003" IS LOWERED OVER TUBE SEATED IN BASE-PIN GAUGE SO THAT THE HOLE AXIS IS COINCIDENT WITH AXIS YY' WITHIN 0.150", AND SO THAT THE BOTTOM SURFACE OF THE FLANGE GAUGE IS PARALLEL TO THE TOP SURFACE OF THE BASE-PIN GAUGE, AND UNTIL THE FLANGE GAUGE RESTS ON THE TUBE-FLANGE SEAL AT POSITION XX'. THE PERPENDICULAR DISTANCE BETWEEN THE TWO GAUGES WILL BE AS SHOWN.

NOTE 7: EXHAUST TIP WILL NOT EXTEND BEYOND THE PLANE WHICH PASSES THROUGH THE ENDS OF THE THREE LONGEST PINS.

832-A

PUSH-PULL RF BEAM POWER AMPLIFIER

TYPICAL CHARACTERISTICS
FOR EACH UNIT



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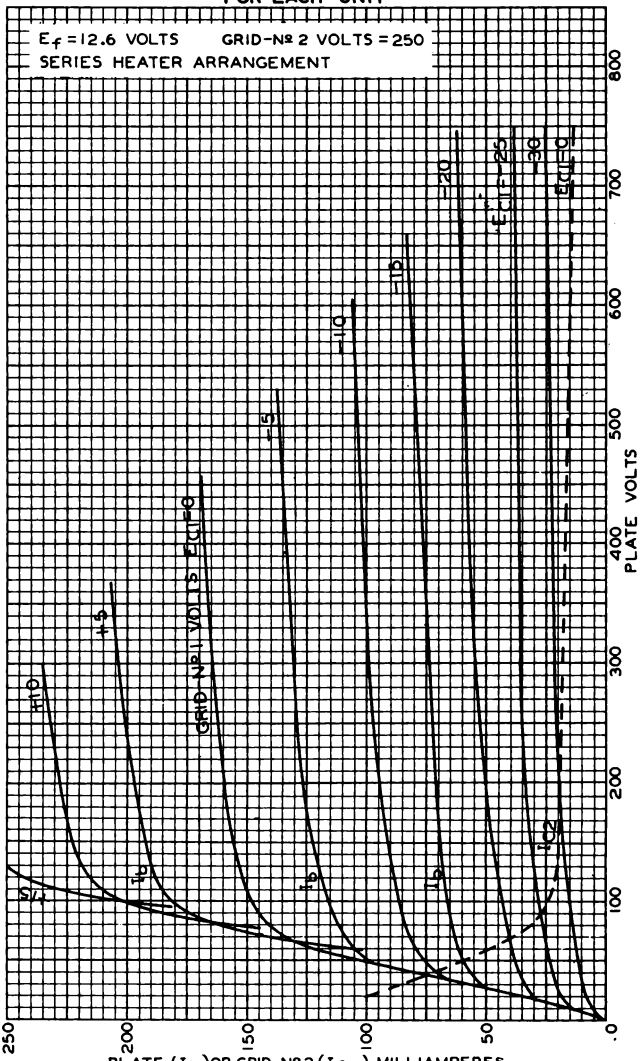
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



FEB. 27, 1951 TUBE DEPARTMENT 92CM-4912R2

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

833-A
POWER TRIODE

Useful with full input up to 30 Mc with natural cooling (20 Mc with forced-air cooling), and with reduced input up to 75 Mc

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:
- Voltage . . . . . 10 ± 5% . . . . . ac or dc volts
- Current at 10 volts . . . 10 . . . . . amp

Amplification Factor, for grid volts = -10 and plate ma = 200. 35

Direct Interelectrode Capacitances:

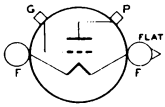
Grid to plate	6.3	μμf
Grid to filament.	12.3	μμf
Plate to filament	8.5	μμf

Mechanical:

Terminal Connections:

F - Filament

G - Grid



P - Plate

Mounting Position . Vertical, with filament posts up or down, or Horizontal, with all terminals in same vertical plane

Overall Length. . . . . 8-5/8" ± 3/16"

Maximum Diameter. . . . . 4-19/32"

Bulb. . . . . T-36 ←

Cooling:

Natural or *Forced Air*—depending on the operating conditions. *Natural Cooling* means that adequate free circulation of air around the tube is necessary. *Forced-Air Cooling* means that an air flow of 40 cfm from a 2"-diameter nozzle directed vertically on bulb between grid and plate seals is required to limit temperature between these seals to 145°C.

Weight (Approx.). . . . . 1 lb ←

Fittings: ←

Filament Connector Assembly RCA-207F1

Grid or Plate Connector (2 required). RCA-208F1

AF POWER AMPLIFIER & MODULATOR - Class B

NATURAL COOLING

	CCS•	*ICAS*••	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE.	3000 max.	3300 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*.	500 max.	500 max.	ma

•,••,*: See next page. ← Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

833-A

833-A

POWER TRIODE

	CCS●	ICAS●●	
MAX.-SIGNAL PLATE INPUT*. .	1125 max.	1300 max.	watts
PLATE DISSIPATION*.	300 max.	350 max.	watts

Typical Operation with Natural Cooling:

Values are for 2 tubes

DC Plate Voltage.	3000	3300	volts
DC Grid Voltage#.	-70	-80	volts
Peak AF Grid-to-Grid Voltage	400	440	volts
Zero-Signal DC Plate Current	100	100	ma
Max.-Signal DC Plate Current	750	780	ma
Effective Load Resistance (Plate to plate).	9500	10500	ohms
Max.-Signal Driving Power (Approx.)	20	30	watts
Max.-Signal Power Output (Approx.)	1650	1900	watts

FORCED-AIR COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE.	4000 max.	4000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*.	500 max.	500 max.	ma
MAX.-SIGNAL PLATE INPUT* .	1600 max.	1800 max.	watts
PLATE DISSIPATION*.	400 max.	450 max.	watts

Typical Operation with Forced-Air Cooling:

Values are for 2 tubes

DC Plate Voltage.	4000	4000	volts
DC Grid Voltage#.	-100	-100	volts
Peak AF Grid-to-Grid Voltage	480	510	volts
Zero-Signal DC Plate Current	100	100	ma
Max.-Signal DC Plate Current	800	900	ma
Effective Load Resistance (Plate to plate).	12000	11000	ohms
Max.-Signal Driving Power (Approx.)	29	38	watts
Max.-Signal Power Output (Approx.)	2400	2700	watts

* Averaged over any audio-frequency cycle of sine-wave form.

●,●●,#: see next page.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

833-A

POWER TRIODE

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

NATURAL COOLING

	CCS●	*ICAS*●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE.	3000 max.	3300 max.	volts
DC PLATE CURRENT.	300 max.	300 max.	ma
PLATE INPUT	450 max.	525 max.	watts
PLATE DISSIPATION	300 max.	350 max.	watts
Typical Operation with Natural Cooling:			
DC Plate Voltage.	3000	3300	volts
DC Grid Voltage#.	-70	-100	volts
Peak RF Grid Voltage. . . .	90	110	volts
DC Plate Current.	150	150	ma
DC Grid Current (Approx.) .	2	2	ma
Driving Power (Approx.)▲. .	10	11	watts
Power Output (Approx.). . .	150	200	watts

FORCED-AIR COOLING

	CCS●	*ICAS*●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE.	4000 max.	4000 max.	volts
DC PLATE CURRENT.	300 max.	300 max.	ma
PLATE INPUT	600 max.	675 max.	watts
PLATE DISSIPATION	400 max.	450 max.	watts
Typical Operation with Forced-Air Cooling:			
DC Plate Voltage.	4000	4000	volts
DC Grid Voltage#.	-120	-120	volts
Peak RF Grid Voltage. . . .	120	130	volts
DC Plate Current.	150	150	ma
DC Grid Current (Approx.) .	2	3	ma
Driving Power (Approx.)▲. .	14	21	watts
Power Output (Approx.). . .	225	250	watts

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

NATURAL COOLING

	CCS●	*ICAS*●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE.	2500 max.	3000 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT.	400 max.	400 max.	ma

For ac filament supply.

▲ At crest of audio-frequency cycle with modulation factor of 1.0.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

833-A

833-A
POWER TRIODE

	CCS●	ICAS●●	
DC GRID CURRENT	100 max.	100 max.	ma
PLATE INPUT	835 max.	1000 max.	watts
PLATE DISSIPATION	200 max.	250 max.	watts
Typical Operation with Natural Cooling:			
DC Plate Voltage.	2500	3000	volts
DC Grid Voltage⊕.	-300	-240	volts
From a grid resistor of .	4000	3400	ohms
Peak RF Grid Voltage. . . .	460	410	volts
DC Plate Current.	335	335	ma
DC Grid Current (Approx.)⊕.	75	70	ma
Driving Power (Approx.)⊕. .	30	26	watts
Power Output (Approx.). . .	635	800	watts

FORCED-AIR COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE.	3000 max.	4000 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT.	450 max.	450 max.	ma
DC GRID CURRENT	100 max.	100 max.	ma
PLATE INPUT	1250 max.	1800 max.	watts
PLATE DISSIPATION	270 max.	350 max.	watts
Typical Operation with Forced-Air Cooling:			
DC Plate Voltage.	3000	4000	volts
DC Grid Voltage⊕.	-300	-325	volts
From a grid resistor of .	3600	3600	ohms
Peak RF Grid Voltage. . . .	490	520	volts
DC Plate Current.	415	450	ma
DC Grid Current (Approx.)⊕.	85	90	ma
Driving Power (Approx.)⊕. .	37	42	watts
Power Output (Approx.). . .	1000	1500	watts

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy□□
and
RF POWER AMPLIFIER--Class C FM Telephony

NATURAL COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE.	3000 max.	3300 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT.	500 max.	500 max.	ma

⊕ Obtained by grid resistor, or from a combination of grid resistor with either fixed supply or cathode resistor.

□□ Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●,●●,⊕: See next page.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

833-A

POWER TRIODE

	CCS●		ICAS●●		
DC GRID CURRENT	100 max.		100 max.		ma
PLATE INPUT	1250 max.		1500 max.		watts
PLATE DISSIPATION	300 max.		350 max.		watts
Typical Operation with Natural Cooling:					
DC Plate Voltage	2250	3000	3000	3000	volts
DC Grid Voltage	-125	-200	-160	-155	volts
From a grid resistor of	1500	3600	2300	2150	ohms
From a cathode resistor of	235	425	400	270	ohms
Peak RF Grid Voltage	300	360	310	350	volts
DC Plate Current	445	415	335	500	ma
DC Grid Current (Approx.)⊕	85	55	70	70	ma
Driving Power (Approx.)⊕	23	20	20	25	watts
Power Output (Approx.)	780	1000	800	1150	watts

FORCED-AIR COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	4000 max.	4000 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT	500 max.	500 max.	ma
DC GRID CURRENT	100 max.	100 max.	ma
PLATE INPUT	1800 max.	2000 max.	watts
PLATE DISSIPATION	400 max.	450 max.	watts
Typical Operation with Forced-Air Cooling:			
DC Plate Voltage	4000	4000	volts
DC Grid Voltage▲▲	-200	-225	volts
From a grid resistor of	2650	2400	ohms
From a cathode resistor of	380	380	ohms
Peak RF Grid Voltage	375	415	volts
DC Plate Current	450	500	ma
DC Grid Current⊕	75	95	ma
Driving Power (Approx.)⊕	26	35	watts
Power Output (Approx.)	1440	1600	watts

⊕ Subject to wide variation depending on the impedance of the load circuit. High-impedance load circuits require more grid current and driving power to obtain the desired output. Low-impedance load circuits need less grid current and driving power, but plate-circuit efficiency is sacrificed. The driver stage should have good regulation and should be capable of delivering considerably more than the required driving power.

▲▲ Obtained from fixed supply, by grid resistor, by cathode resistor, or by combination methods.

●, ●●: See next page. ← Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

833-A
POWER TRIODE

NOTE: When the 833-A is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed-bias must be used to maintain the plate current at a safe value. With a plate voltage of 4000 volts, a fixed bias of at least -90 volts should be used.

→ SELF-RECTIFYING OSCILLATOR OR AMPLIFIER - Class C

NATURAL COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
AC PLATE VOLTAGE (RMS)	4250 max.	4650 max.	volts
DC GRID VOLTAGE	-315 max.	-315 max.	volts
DC PLATE CURRENT	250 max.	250 max.	ma
DC GRID CURRENT	50 max.	50 max.	ma
PLATE INPUT★★	1180 max.	1290 max.	watts
PLATE DISSIPATION	300 max.	350 max.	watts
Typical Operation with Natural Cooling:			
AC Plate Voltage (RMS)	4000	4400	volts
DC Grid Voltage♦	-80	-85	volts
From a grid resistor of	2200	2400	ohms
DC Plate Current	240	240	ma
DC Grid Current (Approx.)	37	36	ma
Driving Power (Approx.)##	13	13.5	watts
Output-Circuit Efficiency (Approx.)	85	85	%
Useful Power Output (Approx.)	710□	800□	watts

FORCED-AIR COOLING

	CCS●	
Maximum Ratings, *Absolute Values:*		
AC PLATE VOLTAGE (RMS)	5650 max.	volts
DC GRID VOLTAGE	-315 max.	volts
DC PLATE CURRENT	250 max.	ma
DC GRID CURRENT	50 max.	ma
PLATE INPUT	1570 max.	watts
PLATE DISSIPATION	400 max.	watts
Typical Operation with Forced-Air Cooling:		
AC Plate Voltage (RMS)	5300	volts
DC Grid Voltage♦	-97	volts
From a grid resistor of	2700	ohms
DC Plate Current	240	ma
DC Grid Current (Approx.)	35	ma
Driving Power (Approx.)##	14	watts
Output-Circuit Efficiency (Approx.)	85	%
Useful Power Output (Approx.)	975□	watts

★★ Power input to plate is 1.11 times the product of ac plate voltage (rms) and the dc plate current.

From a self-rectified driver.

●,●●,♦,□: See next page. → Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

833-A

POWER TRIODE

AMPLIFIER or OSCILLATOR - Class C

With Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply

NATURAL COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	2700 max.	3000 max.	volts
DC GRID VOLTAGE	-450 max.	-450 max.	volts
DC PLATE CURRENT	500 max.	500 max.	ma
DC GRID CURRENT	100 max.	100 max.	ma
PLATE INPUT†	1250 max.	1500 max.	watts
PLATE DISSIPATION	300 max.	350 max.	watts
Typical Operation with Natural Cooling:			
DC Plate Voltage	2500	2750	volts
DC Grid Voltage♦	-130	-135	volts
From a grid resistor of	1560	1770	ohms
DC Plate Current	450	450	ma
DC Grid Current (Approx.)	83	76	ma
Driving Power (Approx.)††	27	25	watts
Output-Circuit Efficiency (Approx.)	85	85	%
Useful Power Output (Approx.)	1865□	2040□	watts

FORCED-AIR COOLING

	CCS●	
Maximum Ratings, *Absolute Values:*		
DC PLATE VOLTAGE	3600 max.	volts
DC GRID VOLTAGE	-450 max.	volts
DC PLATE CURRENT	500 max.	ma
DC GRID CURRENT	100 max.	ma
PLATE INPUT†	1800 max.	watts
PLATE DISSIPATION	400 max.	watts
Typical Operation with Forced-Air Cooling:		
DC Plate Voltage	3300	volts
DC Grid Voltage♦	-155	volts
From a grid resistor of	2100	ohms
DC Plate Current	450	ma
DC Grid Current (Approx.)	73	ma
Driving Power (Approx.)††	26	watts
Output-Circuit Efficiency (Approx.)	85	%
Useful Power Output (Approx.)	2480□	watts

● Continous Commercial Service.

●● Intermittent Commercial and Amateur Service.

† Power input to plate is 1.23 times the product of dc plate voltage times dc plate current.

□ This value of useful power is measured at load of output circuit having the indicated efficiency.

♦,††: See next page.

← Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

833-A
POWER TRIODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current.	1	9.4	10.6	amp
Direct Interelectrode Capacitances:				
Grid to plate	–	5.5	7.1	μμf
Grid to filament. . . .	–	10.1	14.5	μμf
Plate to filament . . .	–	6.4	10.6	μμf
Amplification Factor. . .	2	31.5	38.5	
Grid Current.	3	160	380	ma
Plate Current (1)	3	490	810	ma
Plate Current (2)	4	60	140	ma
Power Output.	5	1150	–	watts

Note 1: With 10 volts dc on filament.

Note 2: With 10 volts ac on filament, dc grid voltage of -10 volts, and dc plate voltage adjusted to give dc plate current of 200 ma.

Note 3: With 10 volts ac on filament, dc plate voltage of 100 volts, and dc grid voltage of +100 volts.

Note 4: With 10 volts ac on filament, dc plate voltage of 2500 volts, and dc grid voltage of -50 volts.

Note 5: In self-excited oscillator circuit, and with 10 volts ac on filament, dc plate voltage of 4000 volts, dc plate current of 450 ma., dc grid current of 80 to 120 ma., grid resistor of 5000 ohms, and frequency of 30 Mc.

♦ Obtained from a grid resistor of the value shown or from a combination of grid resistor and cathode resistor. Fixed bias operation is not recommended. The bias resistor should not be bypassed for the plate and grid voltage supply frequency.

†† From a driver with a rectified, unfiltered, single-phase, full wave plate supply.

RATINGS vs FREQUENCY WITH NATURAL COOLING

FREQUENCY	30	50	75	Mc
MAXIMUM PERMISSIBLE PERCENTAGE of MAXIMUM RATED PLATE VOLTAGE and PLATE INPUT:				
Class B Telephony	100	98	94	%
Class C Telephony	100	90	72	%
Class C Telegraphy	100	90	72	%

RATINGS vs FREQUENCY WITH FORCED-AIR COOLING

FREQUENCY	20	50	75	Mc
MAXIMUM PERMISSIBLE PERCENTAGE of MAXIMUM RATED PLATE VOLTAGE and PLATE INPUT:				
Class B Telephony	100	97	93	%
Class C Telephony	100	83	65	%
Class C Telegraphy	100	83	65	%

→ Indicates a change.

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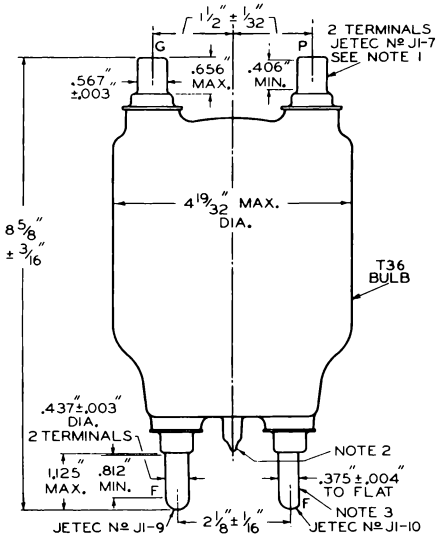
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

833-A
POWER TRIODE



92CM-4786R5

NOTE 1: THE ANGLE FORMED ON A PLANE NORMAL TO THE TUBE AXIS BY THE INTERSECTION OF THE PLANE DETERMINED BY THE AXIS OF THE FILAMENT TERMINALS WITH THE PLANE DETERMINED BY THE AXIS OF THE GRID AND PLATE TERMINALS IS NOT MORE THAN 5°.

NOTE 2: THE MOUNTING SHOULD PROVIDE LIBERAL CLEARANCE FOR THIS TIP.

NOTE 3: THE PLANE THROUGH THE FLAT SIDE OF THE FILAMENT TERMINAL IS 90° ±7° WITH RESPECT TO THE PLANE THROUGH THE AXES OF THE FILAMENT TERMINALS.

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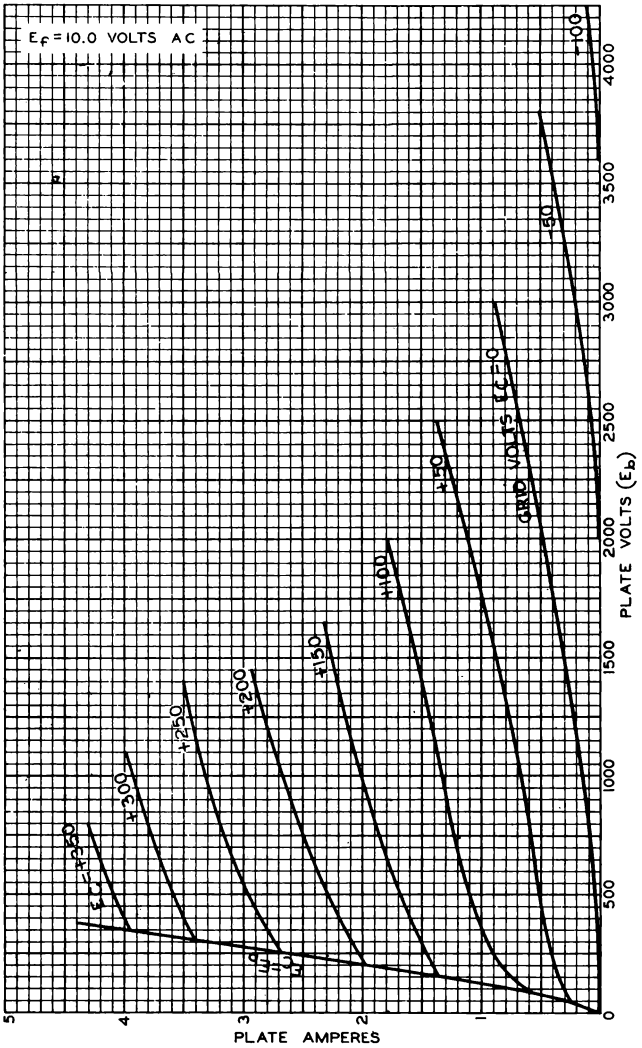
833-A

833-A

AVERAGE PLATE CHARACTERISTICS



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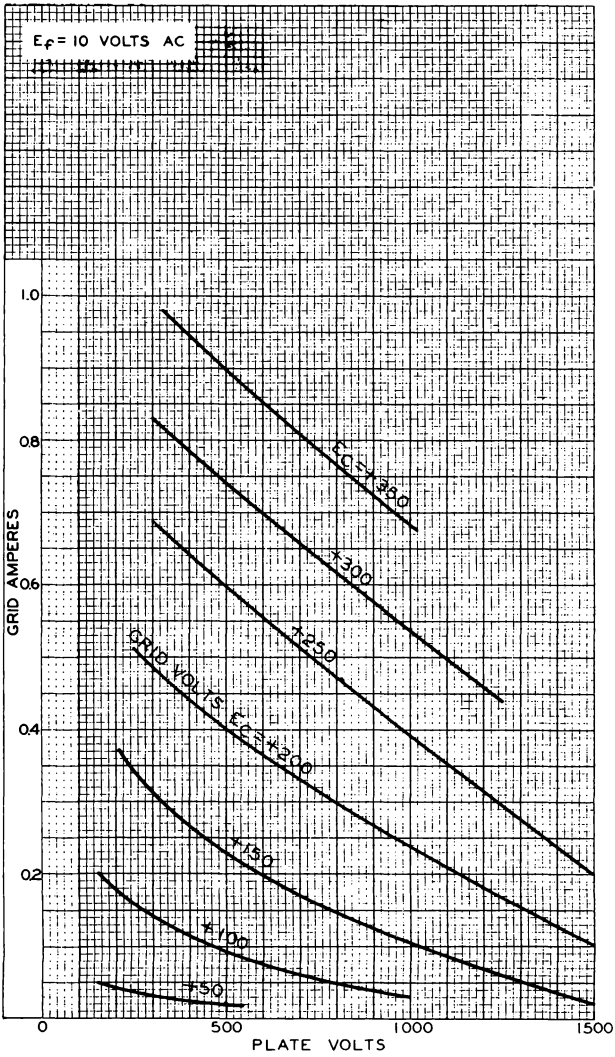
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6196

833-A

833-A

TYPICAL CHARACTERISTICS



834

R-F POWER AMPLIFIER

Filament	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	3.1	amp. ←
Amplification Factor	10.5	
Direct Interelectrode Capacitances:		
Grid to Plate	2.6	μμf
Grid to Filament	2.2	μμf
Plate to Filament	0.6	μμf
Maximum Overall Length		6-7/8"
Maximum Diameter		2-11/16"
Bulb		S-21
Base		Medium 4-Pin, Bayonet
RCA Socket (Type UR-542A)		Stock No.9919

Cooling- Forced air from fan directed at middle and upper portions of bulb is recommended for all classes of service above 60 Mc.

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage			1250 max.	volts
D-C Plate Current			100 max.	ma.
Plate Input			75 max.	watts
Plate Dissipation			50 max.	watts
Typical Operation:				
D-C Plate Voltage	750	1000	1250	volts
D-C Grid Voltage #	-70	-90	-115	volts
Peak R-F Grid Voltage	90	100	115	volts
D-C Plate Current	50	50	50	ma.
D-C Grid Current **	1.0	0.5	0 approx.	ma.
Driving Power ° **	3.3	3.1	3.0 approx.	watts
Power Output	11	16	20 approx.	watts

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage			1000 max.	volts
D-C Grid Voltage			-400 max.	volts
D-C Plate Current			100 max.	ma.
D-C Grid Current			20 max.	ma.
Plate Input			100 max.	watts
Plate Dissipation			35 max.	watts
Typical Operation:				
D-C Plate Voltage		750	1000	volts
D-C Grid Voltage *		14500	17700	ohms
		-290	-310	volts
Peak R-F Grid Voltage		415	435	volts
D-C Plate Current		90	90	ma.
D-C Grid Current **		20	17.5 approx.	ma.
Driving Power **		7.5	6.5 approx.	watts
Power Output		42	58 approx.	watts

* Obtained by grid-leak resistor or by partial self-bias methods.
° At crest of a-f cycle with modulation factor of 1.0.
**, #: See next page. ← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

834

R-F POWER AMPLIFIER

(continued from preceding page)

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation##

D-C Plate Voltage			1250 max.	volts
D-C Grid Voltage			-400 max.	volts
D-C Plate Current			100 max.	ma.
D-C Grid Current			20 max.	ma.
Plate Input			125 max.	watts
Plate Dissipation			50 max.	watts
→ Typical Operation:				
D-C Plate Voltage	750	1000	1250	volts
D-C Grid Voltage †	-175	-200	-225	volts
	8750	11400	15000	ohms
	1600	1850	2150	ohms
Peak R-F Grid Voltage	300	325	350	volts
D-C Plate Current	90	90	90	ma.
D-C Grid Current **	20	17.5	15 approx.	ma.
Driving Power **	5.5	5.0	4.5 approx.	watts
Power Output	42	58	75 approx.	watts

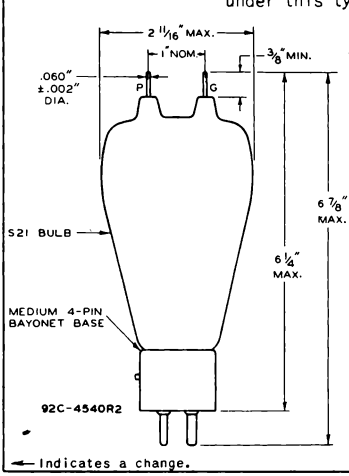
\# For a-c filament supply. If d.c. is used, the stated voltage values should be decreased by approx. one-half of the rated filament voltage.

† Obtained from fixed supply, by grid resistor (8750, 11400, 15000), or cathode resistor (1600, 1850, 2150).

\## Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

Data on operating frequencies for the 834 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY. See also "Cooling" under this type.

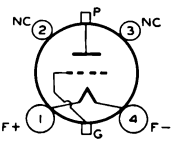


NOTE: Connections to tips P and G should be made by means of radiating connectors to which flexible circuit leads should be clamped.

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

BOTTOM VIEW OF SOCKET CONNECTIONS



Pin 1 - Filament +
Pin 2 - No Connection
Pin 3 - No Connection
Pin 4 - Filament -
P - Plate
G - Grid

→ Indicates a change.

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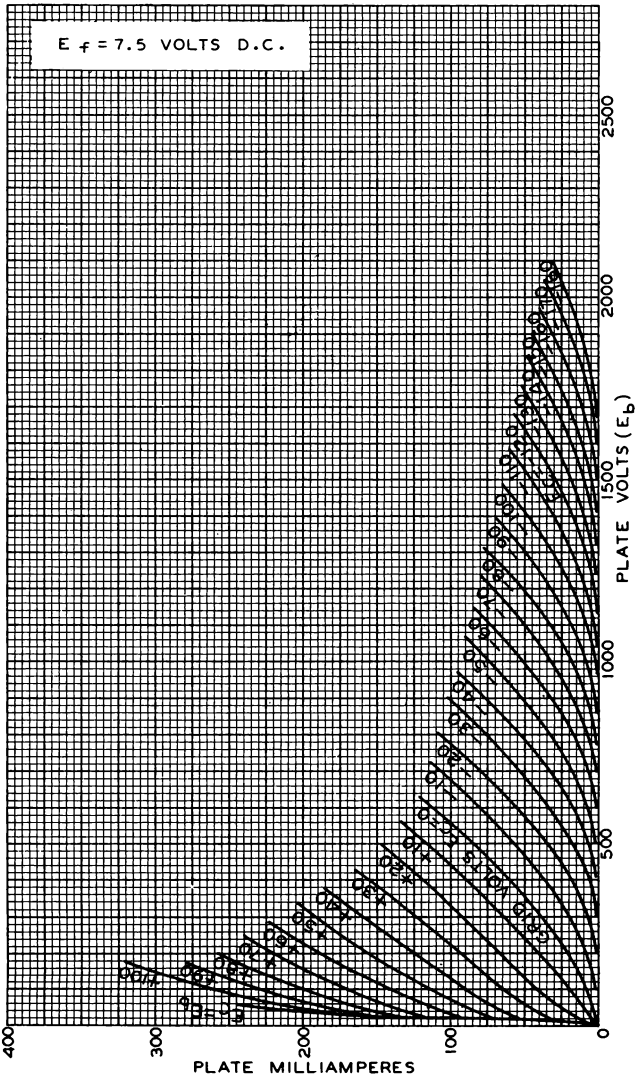
RCA MANUFACTURING COMPANY, INC.

834

AVERAGE PLATE CHARACTERISTICS



JAN. 21, 1936

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4544

835

R-F POWER AMPLIFIER, A-F POWER AMPLIFIER, MODULATOR

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Amplification Factor	12	
Direct Interelectrode Capacitances:		
Grid to Plate	9.25	μμf
Grid to Filament	6	μμf
Plate to Filament	5	μμf
Maximum Overall Length		7-7/8"
Maximum Diameter		2-5/16"
Bulb		T-18
Base		Jumbo 4-Pin
RCA Socket (Type UT-541-A)		Stock No.9936

For additional data, see Type 211. The 211 and the 835 are identical except for interelectrode capacitances.

Data on operating frequencies for the 835 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

OBSOLETE
FOR REPLACEMENT USE

836

HALF-WAVE HIGH-VACUUM RECTIFIER

Heater	Coated Unipotential Cathodes*	
Voltage	2.5	a-c volts
Current	5.0	amp.
Maximum Overall Length		6-9/16"
Maximum Diameter		2-7/16"
Bulb		ST-19
Cap		Medium
Base		Medium 4-Pin, Bayonet
RCA Socket (Type UR-542-A)		Stock No.9937

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS

Peak Inverse Plate Voltage	5000 max. volts
Peak Plate Current	1.0 max. amp.
Average Plate Current	0.25 max. amp.

* The cathodes should be allowed to come up to operating temperature before plate current is drawn from the tube. For average conditions the delay is approximately 40 seconds.

The 836 has two separate cathodes each of which is connected to its respective heater. Plate circuit return should be made to the center-tap of the heater transformer.

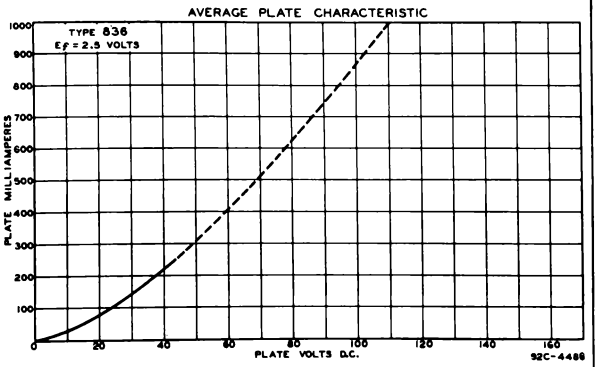
◄ Indicates a change.

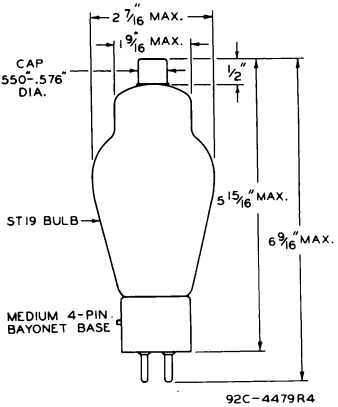
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

836

836

HALF-WAVE HIGH-VACUUM RECTIFIER

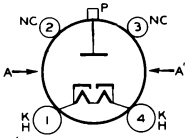




TUBE MOUNTING POSITION

Any

BOTTOM VIEW OF SOCKET CONNECTIONS



AA'=PLANE OF ELECTRODES

Pin 1 - Heater & Cathode
Pin 2 - No Connection
Pin 3 - No Connection
Pin 4 - Heater & Cathode
Cap - Plate

← Indicates a change.

Dec. 1, 1942

DATA

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

837

R-F POWER AMPLIFIER PENTODE

Heater°	Coated Unipotential Cathode	
Voltage□	12.6	a-c or d-c volts ←
Current	0.7	amp.
Transconductance for plate current of 24 ma.	3400	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate (with external shielding)	0.20 max.	μμf
Input	16	μμf
Output	10	μμf
Maximum Overall Length		5-7/8"
Maximum Diameter		2-1/16"
Bulb		ST-16
Cap		Small Metal
Base		Medium 7-Pin Ceramic, Bayonet

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage			500 max.	volts
D-C Suppressor Voltage (Grid #3)			200 max.	volts
D-C Screen Voltage (Grid #2)			200 max.	volts
D-C Plate Current			40 max.	ma.
Plate Input			16 max.	watts
Suppressor Input			5 max.	watts
Screen Input			5 max.	watts
Plate Dissipation			12 max.	watts
Typical Operation:				
D-C Plate Voltage	400	500	500	volts
D-C Suppressor Voltage	0	0	40	volts
D-C Screen Voltage	200	200	200	volts
D-C Grid Voltage (Grid #1)	-25	-25	-25	volts
Peak R-F Grid Voltage	28	25	24	volts
Internal Shield	Connected to cathode at socket			
D-C Plate Current	35	30	30	ma.
D-C Screen Current	10	15	12	ma.
D-C Grid Current	1	0	0	approx.ma.
Driving Power *	0.4	0.2	0.1	approx.watt
Power Output	4	5	5.5	approx.watts

* At crest of a-f cycle with modulation factor of 1.0.

SUPPRESSOR-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage	500 max.	volts
D-C Screen Voltage (Grid #2)	200 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.	volts
D-C Plate Current	40 max.	ma.
D-C Grid Current	8 max.	ma.
Plate Input	16 max.	watts
Screen Input	8 max.	watts
Plate Dissipation	12 max.	watts

□ Should not deviate more than ±10% from rated value.
° See NOTE on DATA 3 page.
← Indicates a change.

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

Typical Operation:

D-C Plate Voltage		400	500	volts
D-C Suppressor Voltage (Grid #3)		-55	-65	volts
D-C Screen Voltage△		6500	14000	ohms
→ D-C Grid Voltage □ §		-20	-20	volts
		2500	5700	ohms
Peak A-F Suppressor Voltage		55	65	volts
Peak R-F Grid Voltage		45	32	volts
Internal Shield	connected to cathode at socket			
D-C Plate Current		35	30	ma.
D-C Screen Current		37	23	ma.
D-C Grid Current		8	3.5	approx.ma.
Driving Power		0.4	0.1	approx.watt
Power Output		4	5	approx.watts

△ Voltage taken from unmodulated plate-voltage supply through resistor.
□ From fixed supply or grid-leak resistor.

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage			500 max.	volts
D-C Suppressor Voltage (Grid #3)			200 max.	volts
D-C Screen Voltage (Grid #2)			200 max.	volts
D-C Grid Voltage (Grid #1)			-200 max.	volts
D-C Plate Current			40 max.	ma.
Plate Input			16 max.	watts
Suppressor Input			5 max.	watts
Screen Input			5 max.	watts
Plate Dissipation			12 max.	watts

Typical Operation:

D-C Plate Voltage	400	500	500	volts
D-C Suppressor Voltage	0	0	40	volts
D-C Screen Voltage	200	200	200	volts
→ D-C Grid Voltage §	-50	-45	-43	volts
Peak R-F Grid Voltage	58	48	44	volts
Peak A-F Grid Voltage	25	20	18	volts
Internal Shield	connected to cathode at socket			
D-C Plate Current	35	30	30	ma.
D-C Screen Current	9	7	6	ma.
D-C Grid Current	1	0	0	approx.ma.
Driving Power *	0.5	0.2	0.15	approx.watt
Power Output	4	5	5.5	approx.watts

* At crest of a-f cycle with modulation factor of 1.0

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Pentode Connection

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage	400 max.	volts
D-C Suppressor Voltage (Grid #3)	200 max.	volts
D-C Screen Voltage (Grid #2)	200 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.	volts
D-C Plate Current	50 max.	ma.

§ See end of tabulation.
← Indicates a change.

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

D-C Grid Current	8 max.	ma.
Plate Input	20 max.	watts
Screen Input	5 max.	watts
Suppressor Input	5 max.	watts
Plate Dissipation	8 max.	watts
Typical Operation:		
D-C Plate Voltage	400	volts
D-C Suppressor Voltage	40	volts
D-C Screen Voltage #	13000	ohms
	140	volts
D-C Grid Voltage▲ §	-40	volts ←
	8000	ohms
Peak R-F Grid Voltage	60	volts
Internal Shield	Connected to cathode at socket	
D-C Plate Current	45	ma.
D-C Screen Current	20	ma.
D-C Grid Current	5	approx.ma.
Driving Power	0.3	approx.watt
Power Output	11	approx.watts

From modulated fixed supply or modulated plate-voltage supply through resistor.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Tetrode Connection - Grids #2 & #3 tied together

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage	400 max.	volts
D-C Screen Voltage (Grids #2 & #3)	200 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.	volts
D-C Plate Current	50 max.	ma.
D-C Grid Current	8 max.	ma.
Plate Input	20 max.	watts
Screen Input	7.5 max.	watts
Plate Dissipation	8 max.	watts
Typical Operation:		
D-C Plate Voltage	400	volts
D-C Screen Voltage ##	10000	ohms
	100	volts
D-C Grid Voltage▲ §	-70	volts ←
	10000	ohms
Peak R-F Grid Voltage	100	volts
Internal Shield	Connected to cathode at socket	
D-C Plate Current	45	ma.
D-C Screen Current	30	ma.
D-C Grid Current	7	approx.ma.
Driving Power	0.7	approx.watt
Power Output	11	approx.watts

Preferably from unmodulated plate-voltage supply through resistor.

▲ Obtained by grid-leak resistor or by partial self-bias methods.

§ See end of tabulation.

← Indicates a change.

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Pentode Connection

Key-down conditions per tube without modulation °°

D-C Plate Voltage			500	max.	volts
D-C Suppressor Voltage (Grid #3)			200	max.	volts
D-C Screen Voltage (Grid #2)			200	max.	volts
D-C Grid Voltage (Grid #1)			-200	max.	volts
D-C Plate Current			80	max.	ma.
D-C Grid Current			8	max.	ma.
Plate Input			32	max.	watts
Suppressor Input			5	max.	watts
Screen Input			8	max.	watts
Plate Dissipation			12	max.	watts
Typical Operation:					
D-C Plate Voltage	400	500	500		volts
D-C Suppressor Voltage	0	0	40		volts
D-C Screen Voltage♦	200	200	200		volts
	6300	10000	20000		ohms
→ D-C Grid Voltage■ §	-40	-85	-75		volts
	5000	10600	18700		ohms
Peak R-F Grid Voltage	70	120	100		volts
Internal Shield	Connected to cathode at socket				
D-C Plate Current	70	60	60		ma.
D-C Screen Current	32	30	15		ma.
D-C Grid Current	8	8	4	approx.	ma.
Driving Power	0.5	0.8	0.4	approx.	watt
Power Output	16	20	22	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Tetrode Connection - Grids #2 & #3 tied together

Key-down conditions per tube without modulation °°

D-C Plate Voltage			500 max.	volts
→ D-C Screen Voltage (Grids #2 & #3)			200 max.	volts
D-C Grid Voltage (Grid #1)			-200 max.	volts
D-C Plate Current			80 max.	ma.
D-C Grid Current			8 max.	ma.
Plate Input			32 max.	watts
Screen Input			8 max.	watts
Plate Dissipation			12 max.	watts
Typical Operation:				
D-C Plate Voltage	400	500		volts
D-C Screen Voltage ♦	11600	28000		ohms
	110	80		volts
D-C Grid Voltage ■ §	8700	8700		ohms
	-70	-70		volts
Peak R-F Grid Voltage	115	110		volts
Internal Shield	Connected to cathode at socket			

°° Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

♦ ■ See next page. § See end of tabulation.

→ Indicates a change.

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

D-C Plate Current	70	60	ma.
D-C Screen Current	25	15	ma.
D-C Grid Current	8	8	approx.ma.
Driving Power	0.75	0.7	approx.watt
Power Output	18	20	approx.watts

◆ Obtained from fixed supply or plate-voltage supply through resistor.

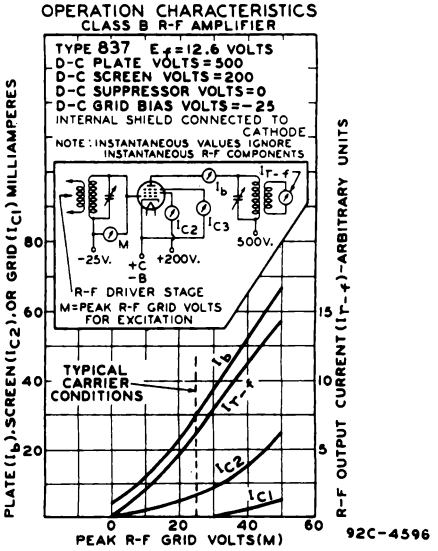
■ Obtained by grid-leak resistor or other self- or fixed-bias method.

§ Maximum total effective grid circuit resistance should not exceed 25000 ohms.

NOTE: In circuits where the cathode is not directly connected to the heater, the potential difference between them should not exceed 100 volts.

The 837, as a crystal-controlled oscillator with either pentode or tetrode connection, may be operated under the conditions shown for class C telegraph services. Because the internal shielding in this tube is unusually effective, it generally is necessary to introduce external feedback in those circuits which depend on the control-grid-to-plate capacity for oscillation.

For use of the 837 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.



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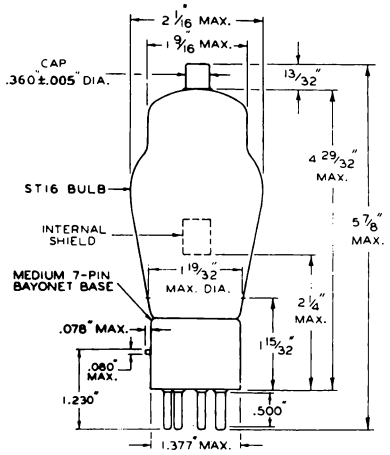
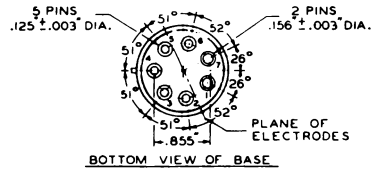
R-F POWER AMPLIFIER PENTODE

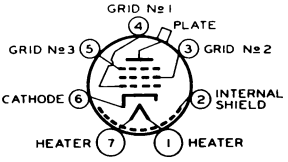




BOTTOM VIEW OF BASE

92C-4832

TOP VIEW OF SOCKET CONNECTIONS

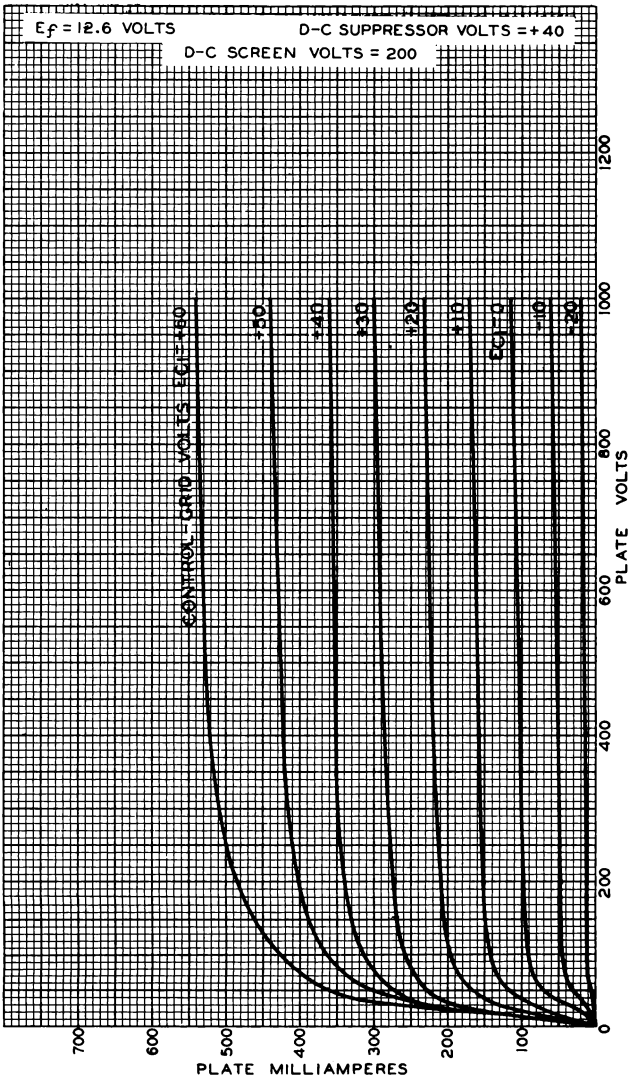


TUBE MOUNTING POSITION

VERTICAL OR HORIZONTAL

837

AVERAGE PLATE CHARACTERISTICS



MAR. 27, 1936

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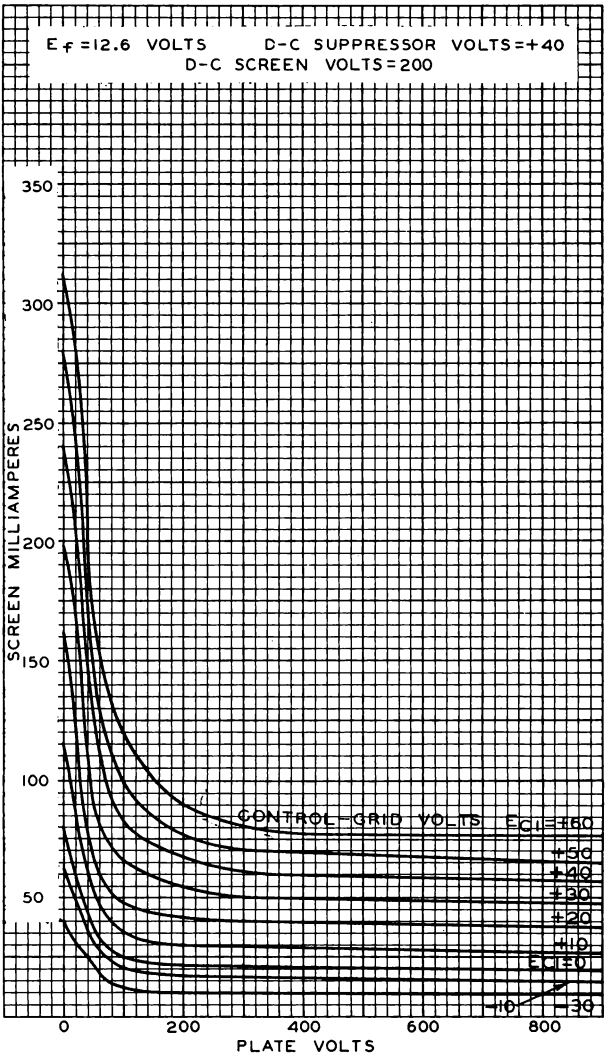
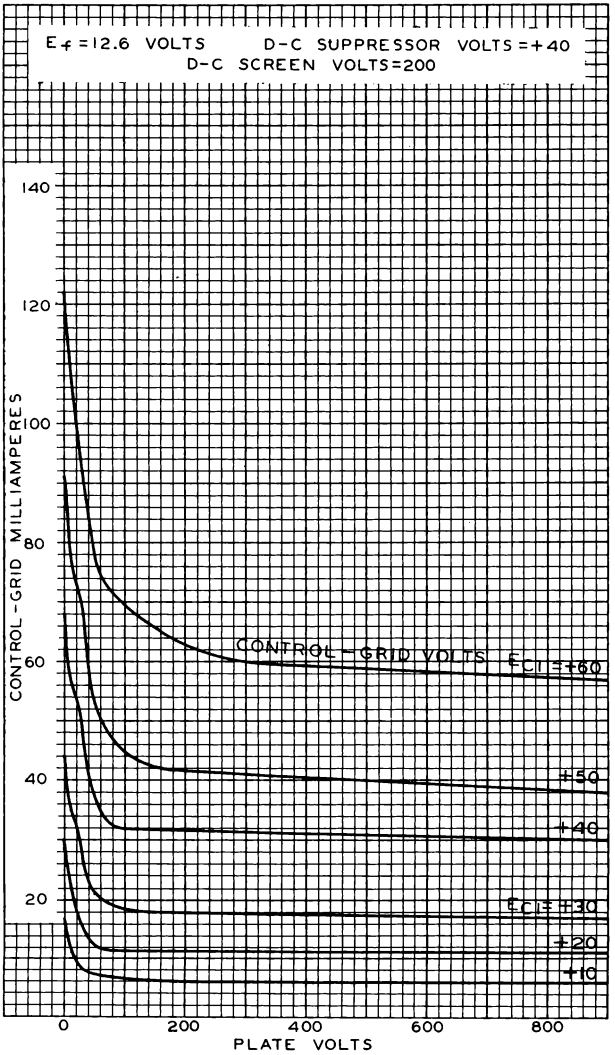
AVERAGE CHARACTERISTICS



837

AVERAGE CHARACTERISTICS



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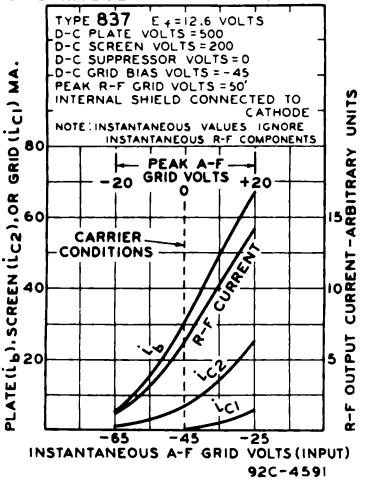
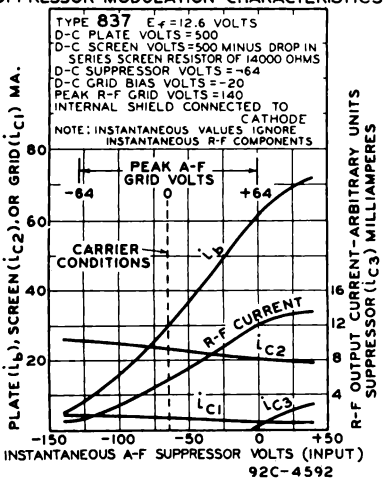
R-F POWER AMPLIFIER PENTODE

GRID MODULATION CHARACTERISTICS



SUPPRESSOR MODULATION CHARACTERISTICS



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CLASS B MODULATOR
R-F POWER AMPLIFIER, OSCILLATOR

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	8	μμf
Grid to Filament	6.5	μμf
Plate to Filament	5	μμf
Maximum Overall Length		7-7/8"
Maximum Diameter		2-5/16"
Bulb		T-18
Base		Jumbo 4-Large Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage		1250 max.	volts
Max-Sig. D-C Plate Current*		175 max.	ma.
Max-Sig. Plate Input*		220 max.	watts
Plate Dissipation*		100 max.	watts
Typical Operation - 2 tubes:			
Unless otherwise specified, values are for 2 tubes.			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	1000	1250	volts
D-C Grid Voltage	0	0	volts
Peak A-F Grid-to-Grid Voltage	200	200	volts
Zero-Sig. D-C Plate Current	106	146	ma.
Max.-Sig. D-C Plate Current	320	320	ma.
Load Resistance (per tube)	1725	2250	ohms
Effective Load Res. (Plate to plate)	6900	9000	ohms
Max.-Sig. Driving Power	7	7.5	approx.watts
Max.-Sig. Power Output #	200	260	approx.watts

* Averaged over any audio-frequency cycle of sine-wave form. ←
\# Approximately 4% harmonic distortion.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		1250 max.	volts
D-C Plate Current		150 max.	ma.
R-F Grid Current		6 max.	amp.
Plate Input		150 max.	watts
Plate Dissipation		100 max.	watts
Typical Operation:			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	1000	1250	volts
D-C Grid Voltage	0	0	volts
Peak R-F Grid Voltage	70	60	volts
D-C Plate Current	130	106	ma.
D-C Grid Current **	15	15	approx.ma.
Driving Power ° **	8	6	approx.watts
Power Output	40	42.5	approx.watts

° At crest of a-f cycle with modulation factor of 1.0.

** See next page. ← Indicates a change

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CLASS B MODULATOR
R-F POWER AMPLIFIER, OSCILLATOR

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			1000 max.	volts
→ D-C Grid Voltage			-400 max.	volts
D-C Plate Current			175 max.	ma.
D-C Grid Current			70 max.	ma.
R-F Grid Current			6 max.	amp.
Plate Input			175 max.	watts
Plate Dissipation			67 max.	watts
Typical Operation:				
Filament Voltage	10	10	a-c	volts
D-C Plate Voltage	750	1000		volts
D-C Grid Voltage	-100	-135		volts
Peak R-F Grid Voltage	220	255		volts
D-C Plate Current	150	150		ma.
D-C Grid Current **	60	60	approx.	ma.
Driving Power **	14	16	approx.	watts
Power Output	65	100	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation#

D-C Plate Voltage			1250 max.	volts
→ D-C Grid Voltage			-400 max.	volts
D-C Plate Current			175 max.	ma.
D-C Grid Current			70 max.	ma.
R-F Grid Current			7.5 max.	amp.
Plate Input			220 max.	watts
Plate Dissipation			100 max.	watts
Typical Operation.				
Filament Voltage	10	10	10	a-c volts
D-C Plate Voltage	750	1000	1250	volts
D-C Grid Voltage	-80	-85	-90	volts
Peak R-F Grid Voltage	190	195	200	volts
D-C Plate Current	150	150	150	ma.
D-C Grid Current **	30	30	30	approx. ma.
Driving Power **	6	6	6	approx. watts
Power Output	65	100	130	approx. watts

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

For use of the 838 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

OUTLINE DIMENSIONS, TUBE SYMBOL, and SOCKET CONNECTIONS for the 838 are the same as for the 211.

← Indicates a change

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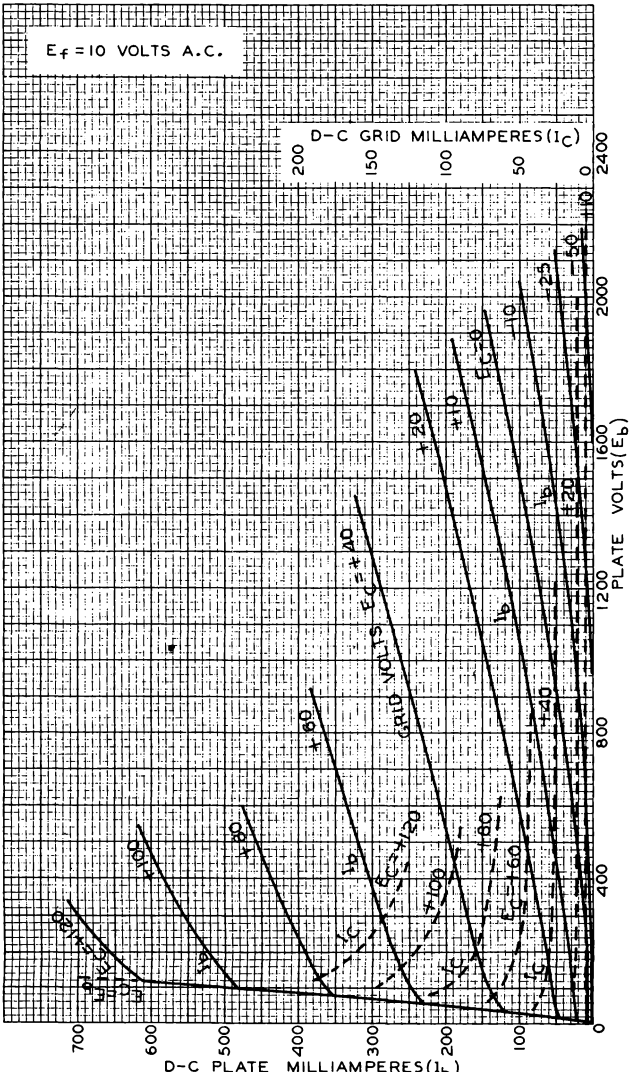
AVERAGE PLATE CHARACTERISTICS



APRIL 15, 1935

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92C-4404

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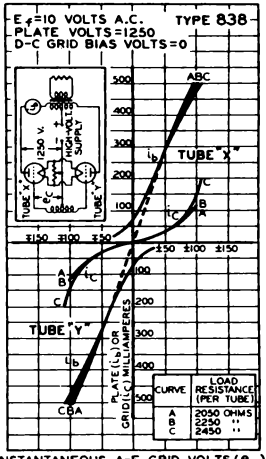
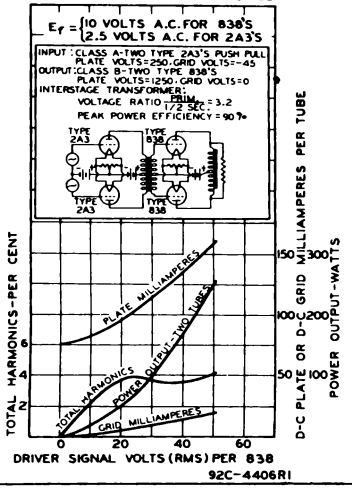
CHARACTERISTICS CURVES

DYNAMIC TRANSFER CHARACTERISTICS



92C-4407R1

OPERATION CHARACTERISTICS



92C-4406R1

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R-F POWER AMPLIFIER, OSCILLATOR, A-F VOLTAGE AMPLIFIER

Filament	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	1.25	amp.
Amplification Factor	30	
Direct Interelectrode Capacitances:		
Grid to Plate	7	μμf
Grid to Filament	4	μμf
Plate to Filament	3	μμf
Maximum Overall Length		5-5/8"
Maximum Diameter		2-3/16"
Bulb		S-17
Base		Medium 4-Pin Bayonet

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F VOLTAGE AMPLIFIER (Resistance-coupled)-Class A

D-C Plate Voltage		425 max.	volts
D-C Plate-Supply Voltage*		1250 max.	volts
Plate Dissipation		12 max.	watts
Typical Operation and Characteristics:			
Filament Voltage	7.5	7.5	d-c volts
D-C Plate-Supply Voltage*	425	1000	volts
D-C Grid Voltage	-6	-9	volts
Peak A-F Grid Voltage	6	9	volts
D-C Plate Current	0.7	2.2	ma.
Plate Resistance	63000	40000	ohms
Transconductance	450	750	μmhos
Load Resistance	250000	250000	ohms
Voltage Output (5% second harmonic)	126	225	volts

* Voltage effective at plate is less than the plate-supply voltage by an amount equal to the voltage drop in the load resistance caused by the plate current.

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage		425 max.	volts
Max-Signal D-C Plate Current*		60 max.	ma.
Max-Signal Plate Input*		25 max.	watts
Plate Dissipation*		15 max.	watts
Typical Operation - 2 tubes:			
Unless otherwise specified, values are for 2 tubes.			
Filament Voltage	7.5	7.5	d-c volts ←
D-C Plate Voltage	350	425	volts
D-C Grid Voltage	-5	-5	volts
Peak A-F Grid-to-Grid Voltage	176	180	volts
Zero-Signal D-C Plate Cur.	7	13	ma.
Max-Signal D-C Plate Cur.	114	120	ma.
Load Resistance (per tube)	1300	1750	ohms
Effective Load Res. (plate to plate)	5200	7000	ohms
Max-Signal Driving Power	3.2	3.6	approx. watts
Max-Signal Power Output	21	28	approx. watts

* Averaged over any audio frequency cycle of sine-wave form. ←

← Indicates a change

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R-F POWER AMPLIFIER, OSCILLATOR, A-F VOLTAGE AMPLIFIER

(continued from preceding page)

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		450 max.	volts
D-C Plate Current		50 max.	ma.
R-F Grid Current		4 max.	amp.
Plate Input		22.5 max.	watts
Plate Dissipation		15 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5 a-c	volts
D-C Plate Voltage	350	450	volts
D-C Grid Voltage	-12	-15	volts
Peak R-F Grid Voltage	60	60	volts
D-C Plate Current	45	45	ma.
D-C Grid Current**	4	4 approx.	ma
Driving Power** °	3.5	3.5 approx.	watts
Power Output	4.25	6 approx.	watts

→ ° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		350 max.	volts
→ D-C Grid Voltage		-200 max.	volts
D-C Plate Current		60 max.	ma.
D-C Grid Current		20 max.	ma.
R-F Grid Current		4 max.	amp.
Plate Input		21 max.	watts
Plate Dissipation		10 max.	watts
Typical Operation:			
Filament	7.5	7.5 a-c	volts
D-C Plate Voltage	250	350	volts
D-C Grid Voltage	-40	-47	volts
Peak R-F Grid Voltage	125	130	volts
D-C Plate Current	50	50	ma.
D-C Grid Current **	15	15 approx.	ma.
Driving Power **	2	2 approx.	watts
Power Output	7	11 approx.	watts

R-F POWER AMPLIFIER & MODULATOR - Class C Telegraphy

Key-down conditions per tube without modulation **

D-C Plate Voltage		450 max.	volts
→ D-C Grid Voltage		-200 max.	volts
D-C Plate Current		60 max.	ma.
D-C Grid Current		20 max.	ma.
R-F Grid Current		5 max.	amp.
Plate Input		27 max.	watts
Plate Dissipation		15 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5 a-c	volts
D-C Plate Voltage	350	450	volts
D-C Grid Voltage	-30	-34	volts
Peak R-F Grid Voltage	115	120	volts
D-C Plate Current	50	50	ma.

**, ** See next page ← Indicates a change

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

841
R-F POWER AMPLIFIER
A-F VOLTAGE AMPLIFIER

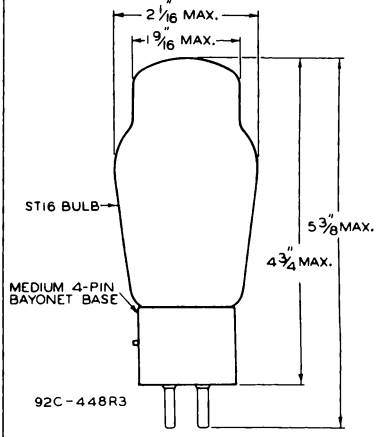
(continued from preceding page)

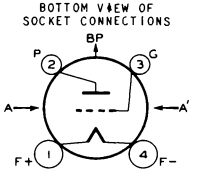
D-C Grid Current**	15	15	approx.ma.
Driving Power**	1.8	1.8	approx.watts
Power Output	11	15	approx.watts

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

** Subject to wide variations as explained on sheet TRANS.TUBE RATINGS.

For the use of the 841 at the higher frequencies refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.





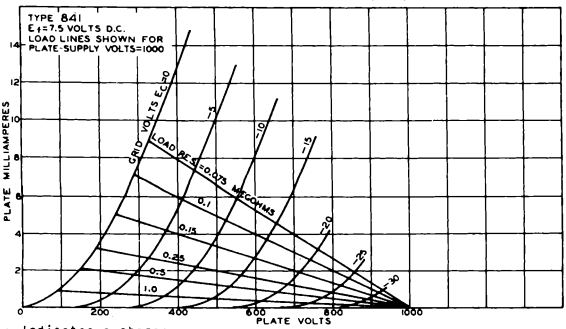
AA'=PLANE OF ELECTRODES

Pin 1 - Filament +
Pin 2 - Plate
Pin 3 - Grid
Pin 4 - Filament -
BP - Bayonet Pin

. TUBE MOUNTING POSITION

VERTICAL: Base down
HORIZONTAL: Plate in vertical plane (on edge)

AVERAGE PLATE CHARACTERISTICS



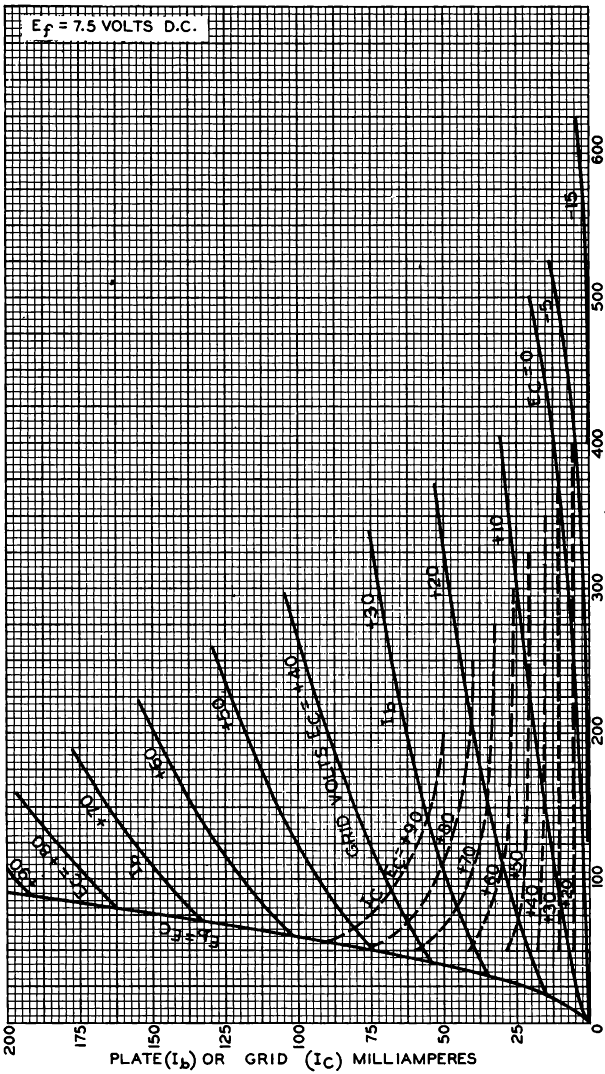
← Indicates a change.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

841

841

AVERAGE PLATE CHARACTERISTICS



FEB. 12, 1934

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA. HARRISON, NEW JERSEY

92S-5454

842

A-F POWER AMPLIFIER, MODULATOR

Filament	Thoriated Tungsten		
Voltage	7.5		a-c or d-c volts
Current	1.25		amp.
Amplification Factor	3		
Direct Interelectrode Capacitances:			
Grid to Plate	7	μμf	
Grid to Filament	4	μμf	
Plate to Filament	3	μμf	
Maximum Overall Length			5-5/8"
Maximum Diameter			2-3/16"
Bulb			S-17
Base			Medium 4-Pin Bayonet

A-F POWER AMPLIFIER & MODULATOR - Class A

D-C Plate Voltage		425 max.	volts
Plate Dissipation		12 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5	a-c volts
D-C Plate Voltage	350	425	volts
Grid Voltage*	-72	-100	volts
Peak Grid Swing	67	95	volts
Plate Current	34	28	ma.
Mutual Conductance	1250	1200	μmhos
Plate Resistance	2400	2500	ohms
Load Resistance	5000	8000	ohms
U.P.O. (5 % second harmonic)	2.1	3.0	watts

* Grid-voltage values are given with respect to the mid-point of filament operated on a.c. If d.c. is used, each stated value of grid voltage should be decreased by 5.0 volts and should be referred to the negative end of the filament.

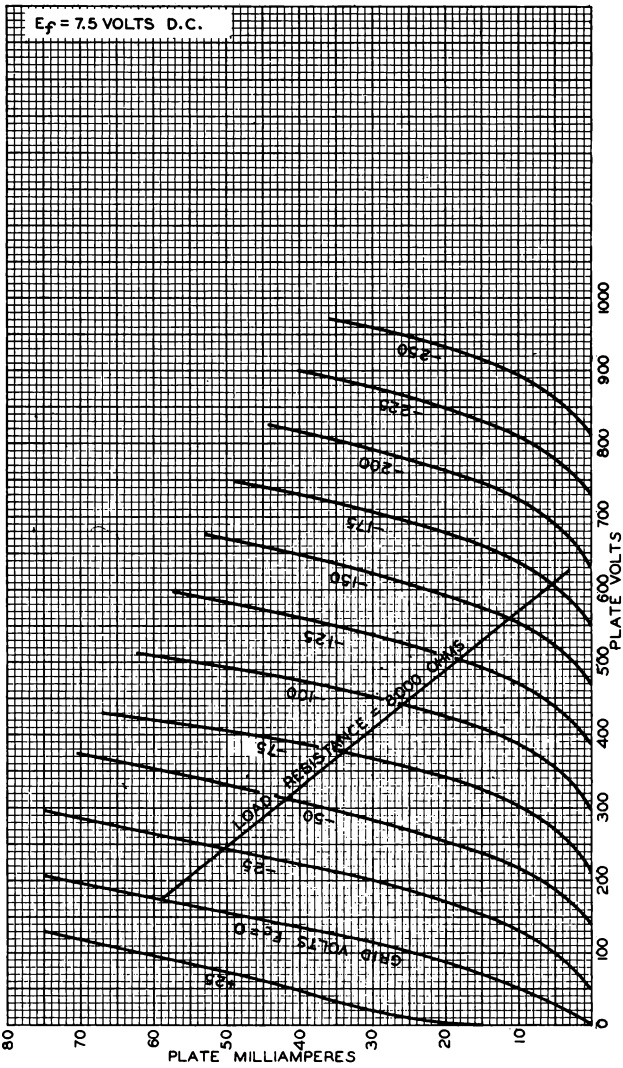
In cases where the 842 is employed in resistance-coupled circuits, the recommended safe maximum value of grid leak is 1.0 megohm when the self-biasing method of obtaining grid bias is used. With fixed bias, however, the d-c resistance in the grid-coupling circuit should not exceed 0.25 megohm.

OUTLINE DIMENSIONS, TUBE SYMBOL, and SOCKET CONNECTIONS for the 842 are the same as for the 841.

842

842

AVERAGE PLATE CHARACTERISTICS



843

R-F POWER AMPLIFIER, OSCILLATOR, A-F POWER AMPLIFIER

Heater	Coated Unipotential Cathode *		
Voltage	2.5	a-c or d-c	volts
Current	2.5		amp.
Amplification Factor	7.7		
Direct Interelectrode Capacitances:			
Grid to Plate	4.5		μμf
Grid to Cathode	4		μμf
Plate to Cathode	4		μμf
Maximum Overall Length			5-5/8"
Maximum Diameter			2-3/16"
Bulb			S-17
Base			Medium 5-Pin

A-F POWER AMPLIFIER - Class A

D-C Plate Voltage		425 max.	volts
Plate Dissipation		12 max.	watts
Typical Operation:			
D-C Plate Voltage	350	425	volts
D-C Grid Voltage	-25	-35	volts
A-F Grid Voltage	25	35	volts
D-C Plate Current	25	25	ma.
Transconductance	1600	1600	μmhos
Plate Resistance	4800	4800	ohms
Load Resistance	9500	12000	ohms
U.P.O. (5% second harmonic)	0.95	1.6	watts

The d-c resistance in the grid circuit should not exceed 0.5 megohm with cathode bias, or 0.1 megohm without cathode bias.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage		450 max.	volts
D-C Plate Current		30 max.	ma.
Plate Dissipation		15 max.	watts
Typical Operation:			
D-C Plate Voltage	350	450	volts
Grid Voltage	-40	-55	volts
D-C Plate Current	25	25	ma.
Power Output	2	3	approx.watts

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage		350 max.	volts	
D-C Grid Voltage		-200 max.	volts	←
D-C Plate Current		40 max.	ma.	
D-C Grid Current		7.5 max.	ma.	
Plate Input		14 max.	watts	←
Plate Dissipation		10 max.	watts	
Typical Operation:				
D-C Plate Voltage	250	350	volts	
Grid Voltage	-100	-150	volts	
D-C Plate Current	30	30	ma.	
D-C Grid Current **	7	7	approx.ma.	
Driving Power **	1.3	1.6	approx.watts	
Power Output	3	5	approx.watts	

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

*Key-down conditions per tube without modulation **

D-C Plate Voltage		450 max.	volts	
D-C Grid Voltage		-200 max.	volts	←
D-C Plate Current		40 max.	ma.	
D-C Grid Current		7.5 max.	ma.	
Plate Input		18 max.	watts	←
Plate Dissipation		15 max.	watts	
Typical Operation:				
D-C Plate Voltage	350	450	volts	
Grid Voltage	-100	-140	volts	
D-C Plate Current	30	30	ma.	
D-C Grid Current **	5	5	approx.ma.	
Driving Power **	0.8	1.0	approx.watts	
Power Output	5	7.5	approx.watts	

* In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be limited to 45 volts.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

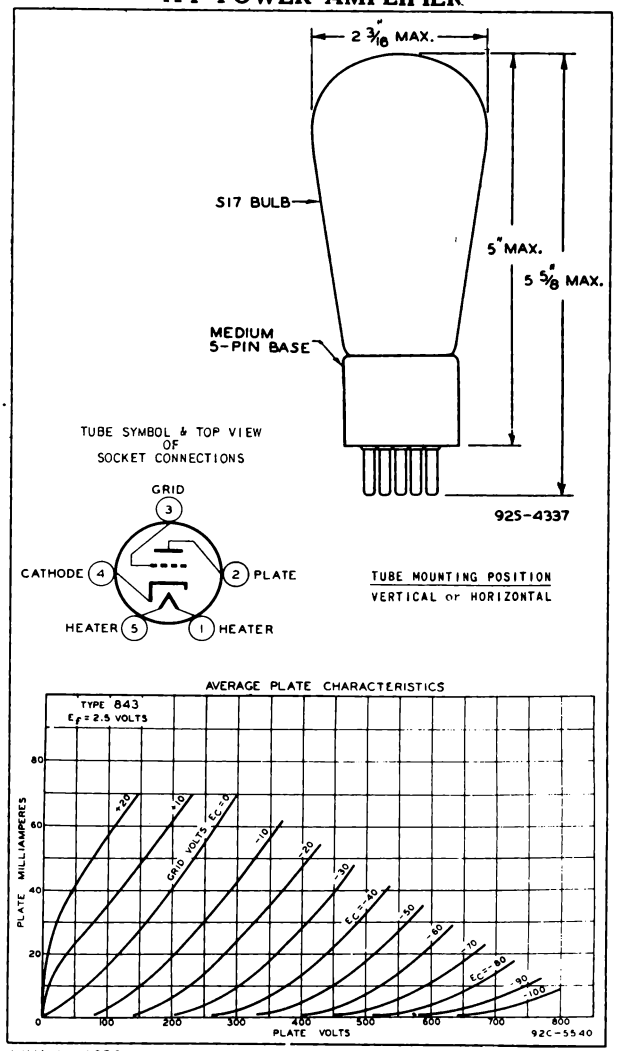
← Indicates a change.

For use of the 843 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

843

843
R-F POWER AMPLIFIER, OSCILLATOR, A-F POWER AMPLIFIER



RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

845

MODULATOR, A-F POWER AMPLIFIER

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Amplification Factor	5.3	
Direct Interelectrode Capacitances:		
Grid to Plate	13.5	μμf
Grid to Filament	6	μμf
Plate to Filament	6.5	μμf
Maximum Overall Length		7-7/8"
Maximum Diameter		2-5/16"
Bulb		T-18
Base		Jumbo 4-Large Pin
RCA Socket		Type UT-541 ←

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class A_1

D-C Plate Voltage			1250 max.	volts
Plate Dissipation			100 max.	watts ←
Typical Operation:				←
D-C Plate Voltage	750	1000	1250	volts
D-C Grid Voltage*	-98	-145	-195	volts
Peak A-F Grid Voltage	93	140	190	volts
D-C Plate Current	95	90	80	ma.
Transconductance	3100	3100	3100	μmhos
Plate Resistance	1700	1700	1700	ohms
Load Resistance	3400	6000	11000	ohms
U.P.O. (5% second harmonic)	15	24	30	watts

NOTE: In cases where the input circuit to the 845 is resistance coupled, the resistance in the grid circuit should not exceed 0.5 megohm when cathode bias is used. Without cathode bias, the d-c resistance in the grid-coupling circuit should not exceed 0.1 megohm.

A-F POWER AMPLIFIER & MODULATOR - Class AB_1 ←

D-C Plate Voltage			1250 max.	volts
D-C Grid Voltage			-400 max.	volts
D-C Plate Current			120 max.	ma.
Plate Input			150 max.	watts
Plate Dissipation			100 max.	watts
Typical Operation:				
Unless otherwise specified, values are for 2 tubes				
D-C Plate Voltage		1000	1250	volts
D-C Grid Voltage*		-175	-225	volts
Peak A-F Grid-to-Grid Voltage		340	440	volts
Zero-Signal D-C Plate Current		40	40	ma.
Max.-Signal D-C Plate Current		230	240	ma.
Load Resistance (per tube)		1150	1650	ohms
Effective Load Res. (plate to plate)		4600	6600	ohms
Max.-Signal Power Output		75	115	approx. watts

* With a-c filament supply.

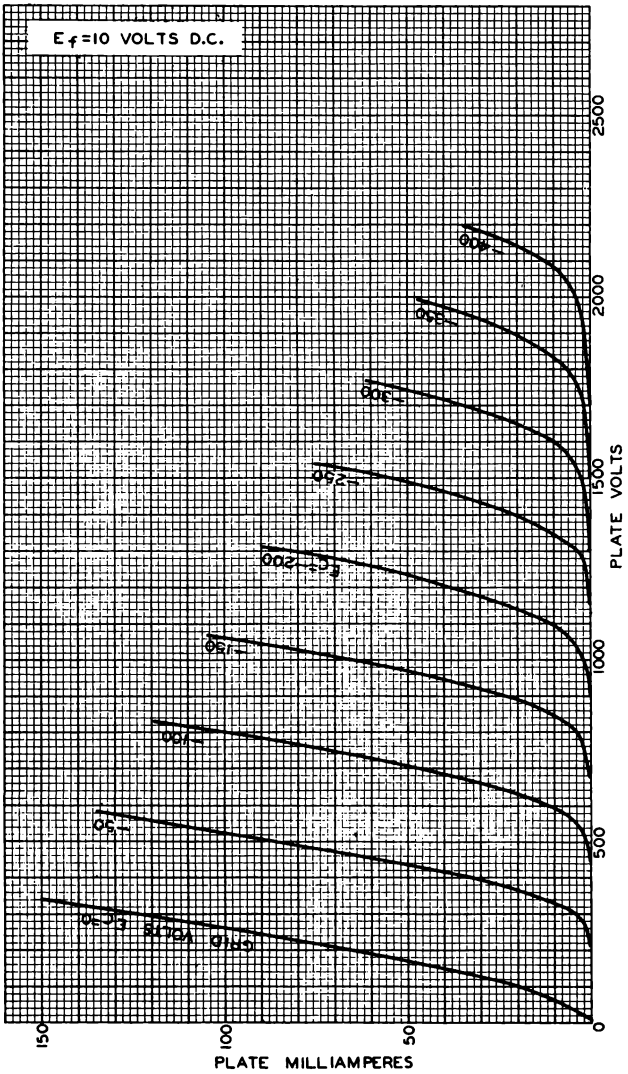
OUTLINE DIMENSIONS, TUBE SYMBOL, and SOCKET CONNECTIONS for the 845 are the same as for the 211.

← Indicates a change.

845

845

AVERAGE PLATE CHARACTERISTICS



NOV. 1, 1933

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-5310

846

OSCILLATOR, R-F POWER AMPLIFIER

(WATER COOLED)

Filament	Tungsten	
Voltage	11	a-c or d-c volts
Current	51	amp.
Amplification Factor	40	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	9	μμf
Grid to Filament	6.5	μμf
Plate to Filament	1.5	μμf
Maximum Overall Length		9-1/2"
Maximum Radius		3-3/8"
Base		None
Water Jacket		Special

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

This tube can often be operated at reduced filament voltage as explained on sheet TYPES OF CATHODES in front of book.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	7500 max.	volts
D-C Plate Current	0.5 max.	amp.
R-F Grid Current	24 max.	amp.
Plate Input	3.75 max.	kw
Plate Dissipation	2.5 max.	kw
Typical Operation:		
Filament Voltage	11	d-c volts
D-C Plate Voltage	7000	volts
D-C Grid Voltage	-100	approx. volts
Peak R-F Grid Voltage °	1275	approx. volts
D-C Plate Current	0.45	amp.
Driving Power ** °	175	approx. watts
Power Output	1	approx. kw

°. At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			6000 max.	volts
D-C Grid Voltage			-1000 max.	volts
D-C Plate Current			0.5 max.	amp.
D-C Grid Current			0.15 max.	amp.
R-F Grid Current			24 max.	amp.
Plate Input			3 max.	kw
Plate Dissipation			1.66 max.	kw
Typical Operation:				
Filament Voltage	11	11	11	a-c volts
D-C Plate Voltage	4000	5000	6000	volts
D-C Grid Voltage	-850	-900	-950	approx. volts

** See next page.

(continued on next page)

846
OSCILLATOR, R-F POWER AMPLIFIER

(continued from preceding page)

Peak R-F Grid Voltage	1600	1700	1950	approx.volts
D-C Plate Current	0.3	0.4	0.5	amp.
D-C Grid Current **	0.080	0.100	0.125	approx.amp.
Driving Power **	125	175	200	approx.watts
Power Output	0.9	1.5	2.25	approx.kw

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ✱

D-C Plate Voltage	7500 max.	volts
D-C Grid Voltage	-1000 max.	volts
D-C Plate Current	1.0 max.	amp.
D-C Grid Current	0.15 max.	amp.
R-F Grid Current	30 max.	amp.
Plate Input	7.5 max.	kw
Plate Dissipation	2.5 max.	kw

Typical Operation:

Filament Voltage	11	11	11	a-c volts
D-C Plate Voltage	5000	6000	7000	volts
D-C Grid Voltage	-800	-850	-900	approx.volts
Peak R-F Grid Voltage	1850	2040	2300	approx.volts
D-C Plate Current	0.60	0.75	0.90	amp.
D-C Grid Current **	0.11	0.125	0.14	approx.amp.
Driving Power **	175	235	300	approx.watts
Power Output	2	3	4.25	approx.kw

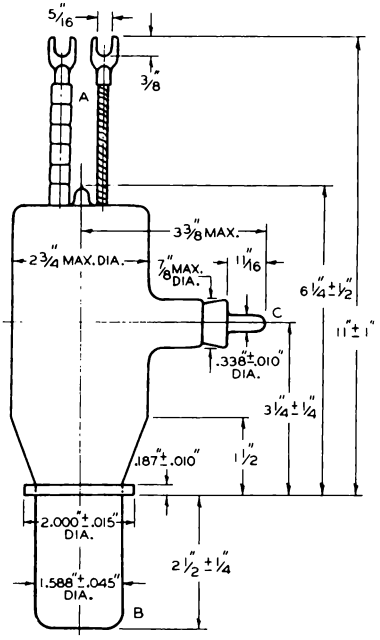
✱ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

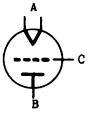
For use of the 846 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs Frequency.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

846
OSCILLATOR, R-F POWER AMPLIFIER



TUBE SYMBOL
AND
TERMINAL CONNECTIONS



A - Filament
B - Plate
C - Grid

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

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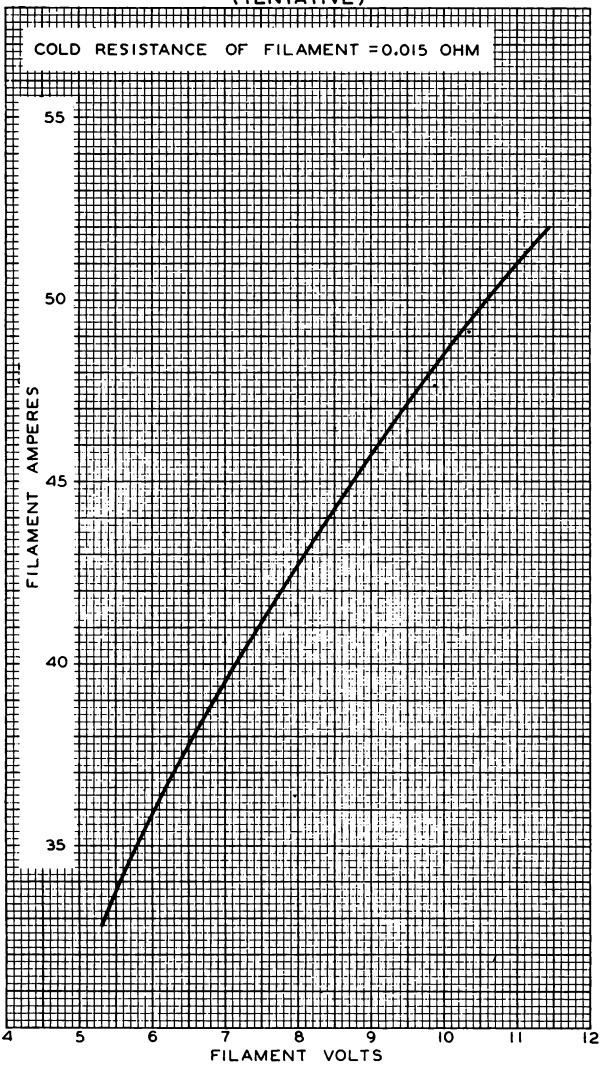
846

AVERAGE FILAMENT CHARACTERISTIC
(TENTATIVE)



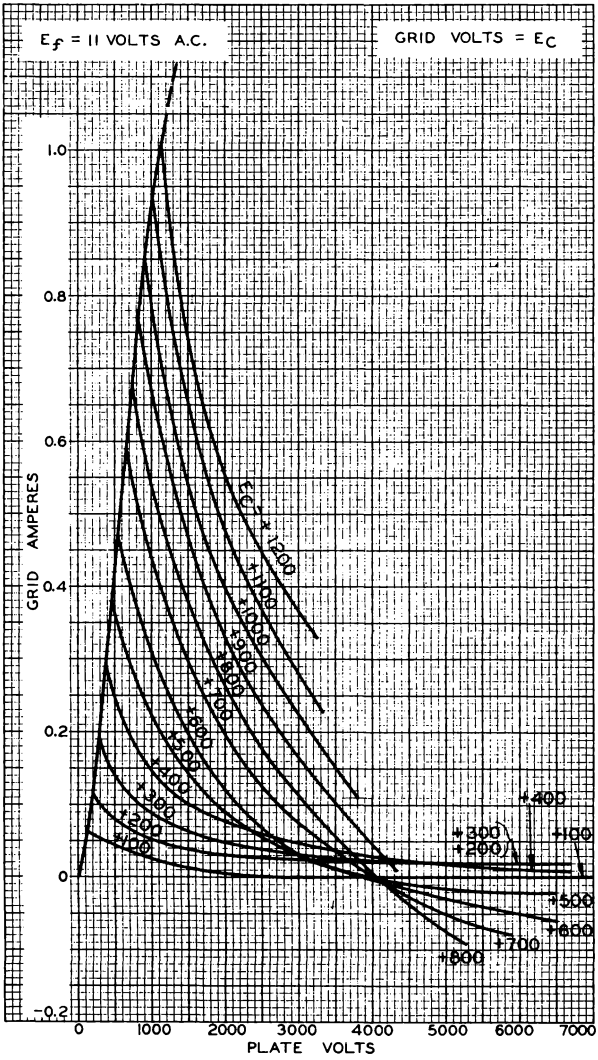
JUNE 19, 1935

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4503

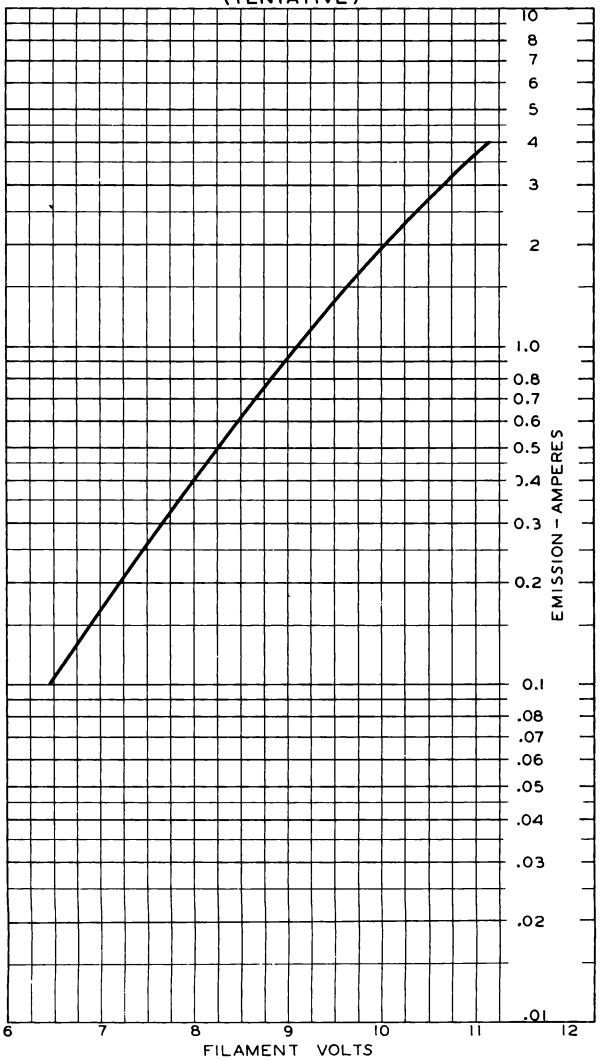
846

TYPICAL CHARACTERISTICS



846

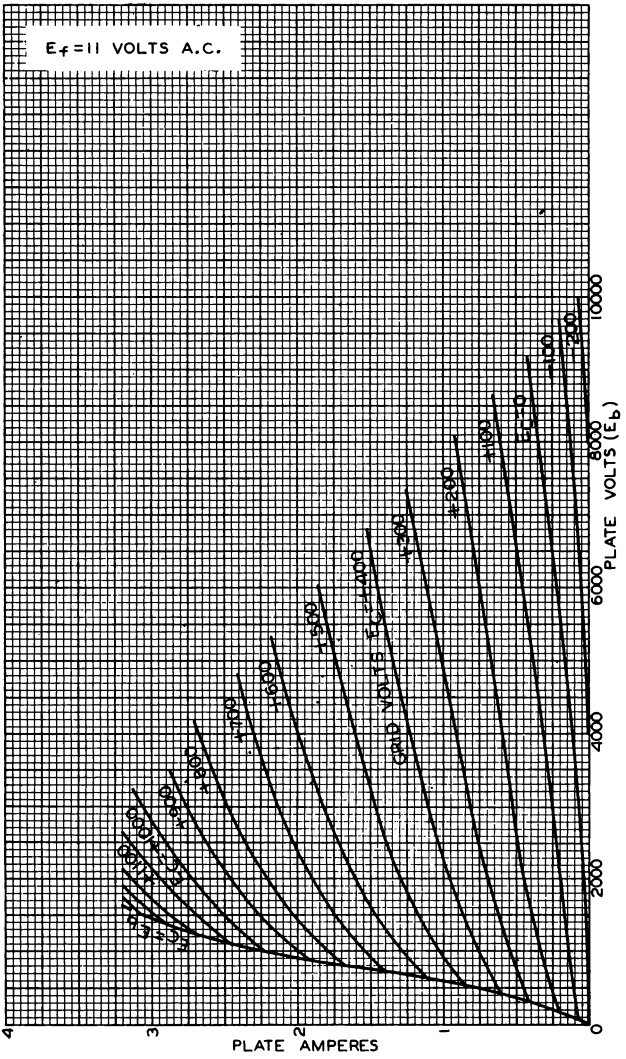
AVERAGE FILAMENT-EMISSION CHARACTERISTIC
(TENTATIVE)



846

846

AVERAGE PLATE CHARACTERISTICS



849

MODULATOR, A-F POWER AMPLIFIER, R-F POWER AMPLIFIER, OSCILLATOR

Filament	Thoriated Tungsten	
Voltage	11	a-c or d-c volts
Current	5	amp.
Amplification Factor	19	
Direct Interelectrode Capacitances:		
Grid to Plate	33.5	μμf
Grid to Filament	17	μμf
Plate to Filament	3	μμf
Overall Length		14-1/4" ± 1/8"
Maximum Diameter		4-1/16"
Bulb		T-32
Cap		No.1904
Base		No.3503
RCA End-Mountings		Types UT-1085, UT-1086 ←

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class A

D-C Plate Voltage			3000 max.	volts
Plate Dissipation			300 max.	watts
Typical Operation:				
D-C Plate Voltage	2000	2500	3000	volts
D-C Grid Voltage	-74	-104	-132	volts
Peak A-F Grid Voltage	68	98	126	volts
D-C Plate Current	0.135	0.110	0.100	amp.
Mutual Conductance	6500	6050	5850	μmhos
Plate Resistance	2950	3150	3250	ohms
Load Resistance	6000	12000	18000	ohms
U.P.O. (5% second harmonic)	58	81	100	watts

The d-c resistance in the grid circuit should not exceed 0.25 megohm with cathode bias; 25000 ohms without cathode bias.

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage			3000 max.	volts
Max.-Signal D-C Plate Current *			0.35 max.	amp.
Max.-Signal Plate Input *			825 max.	watts
Plate Dissipation *			300 max.	watts
Typical Operation:				
Unless otherwise specified, values are for 2 tubes				
D-C Plate Voltage	2000	2500	3000	volts
D-C Grid Voltage	-105	-130	-155	volts
Peak A-F Grid-to-Grid Volt.	450	480	500	volts
Zero-Sig. D-C Plate Cur.	0.014	0.02	0.024	amp.
Max.-Sig. D-C Plate Cur.	0.65	0.56	0.52	amp.
Load Resistance (per tube)	1600	2600	3200	ohms
Effective Load Resistance (plate to plate)	6400	10400	12800	ohms
Max.-Signal Driving Power	16	14	12	approx.watts ←
Max.-Signal Power Output	900	1000	1100	approx.watts

* Averaged over any audio-frequency cycle of sine-wave form.

<- Indicates a change.

849

MODULATOR, A-F POWER AMPLIFIER, R-F POWER AMPLIFIER, OSCILLATOR

(continued from preceding page)

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			2500 max.	volts
D-C Plate Current			0.35 max.	amp.
Plate Input			600 max.	watts
Plate Dissipation			400 max.	watts
Typical Operation:				
D-C Plate Voltage	1500	2000	2500	volts
D-C Grid Voltage	-70	-95	-125	volts
Peak R-F Grid Voltage	140	140	140	volts
D-C Plate Current	0.320	0.265	0.216	amp.
→ D-C Grid Current **	5	3	1	approx.ma.
Driving Power ** °	18	15	12	approx.watts
Power Output	150	170	180	approx.watts

° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage			2000 max.	volts
D-C Grid Voltage			-500 max.	volts
D-C Plate Current			0.35 max.	amp.
D-C Grid Current			0.125 max.	amp.
Plate Input			700 max.	watts
Plate Dissipation			270 max.	watts
Typical Operation:				
D-C Plate Voltage		1500	2000	volts
→ D-C Grid Voltage ¶		7100	10000	ohms
		-250	-300	volts
Peak R-F Grid Voltage		400	450	volts
D-C Plate Current		0.3	0.3	amp.
D-C Grid Current **		0.035	0.03	approx.amp.
Driving Power **		14	14	approx.watts
Power Output		300	425	approx.watts

¶ Obtained by grid leak or partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage			2500 max.	volts
D-C Grid Voltage			-500 max.	volts
D-C Plate Current			0.35 max.	amp.
D-C Grid Current			0.125 max.	amp.
Plate Input			875 max.	watts
Plate Dissipation			400 max.	watts
Typical Operation:				
D-C Plate Voltage	1500	2000	2500	volts
→ D-C Grid Voltage △	5000	8000	12500	ohms
	-175	-200	-250	volts
Peak R-F Grid Voltage	310	325	360	volts
D-C Plate Current	0.3	0.3	0.3	amp.

**, ##, △: See next page.

← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

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MODULATOR, A-F POWER AMPLIFIER, R-F POWER AMPLIFIER, OSCILLATOR

(continued from preceding page)

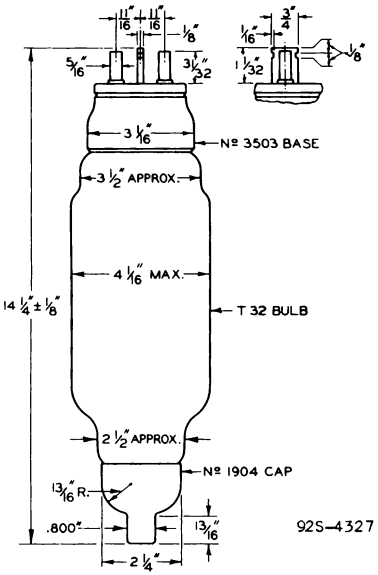
D-C Grid Current **	0.035	0.025	0.02	approx.amp.
Driving Power **	11	9	8	approx.watts
Power Output	300	425	560	approx.watts

△ Obtained by grid-leak resistor or other self- or fixed-bias method.

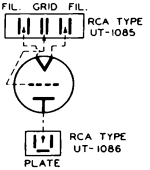
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

For use of the 849 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.



TUBE SYMBOL & CONNECTIONS TO END-MOUNTINGS

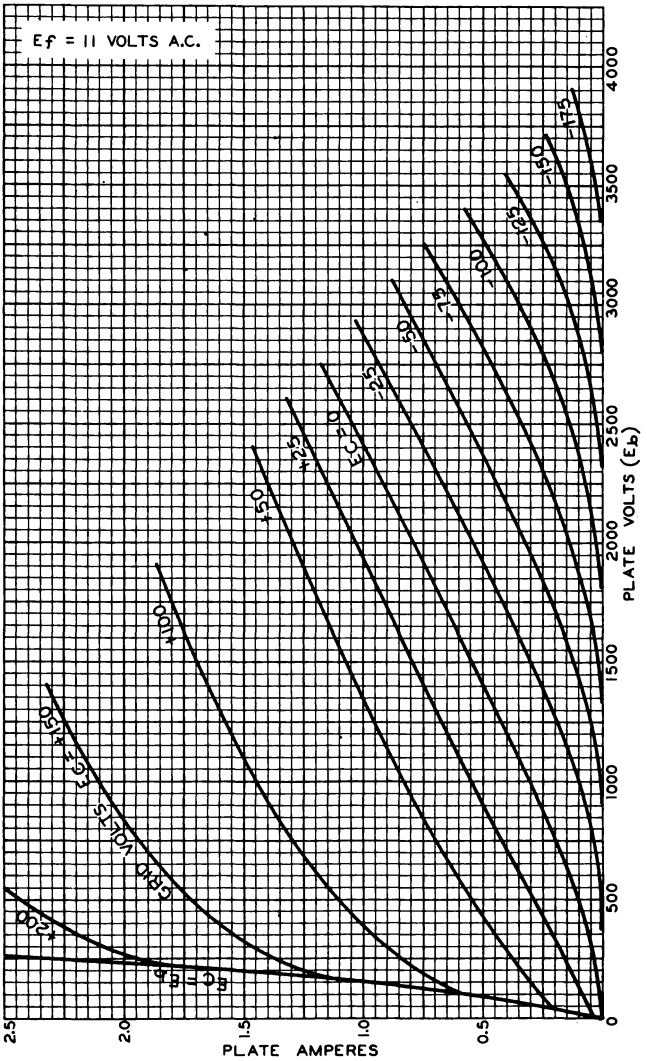


TUBE MOUNTING POSITION

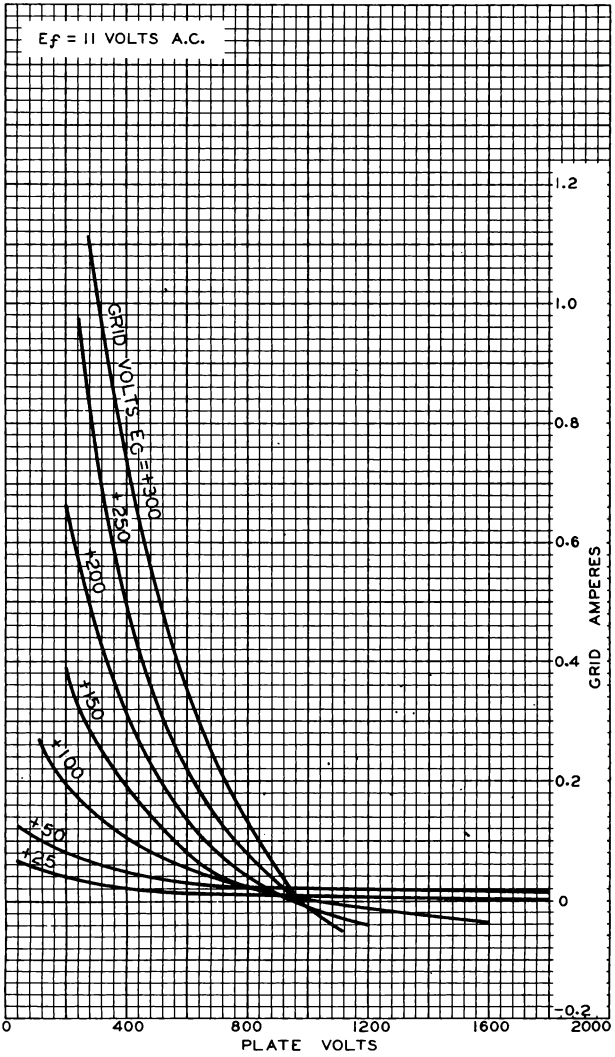
VERTICAL: Filament base (large) up.
HORIZONTAL: Filament in vertical plane (on edge).

849

AVERAGE PLATE CHARACTERISTICS

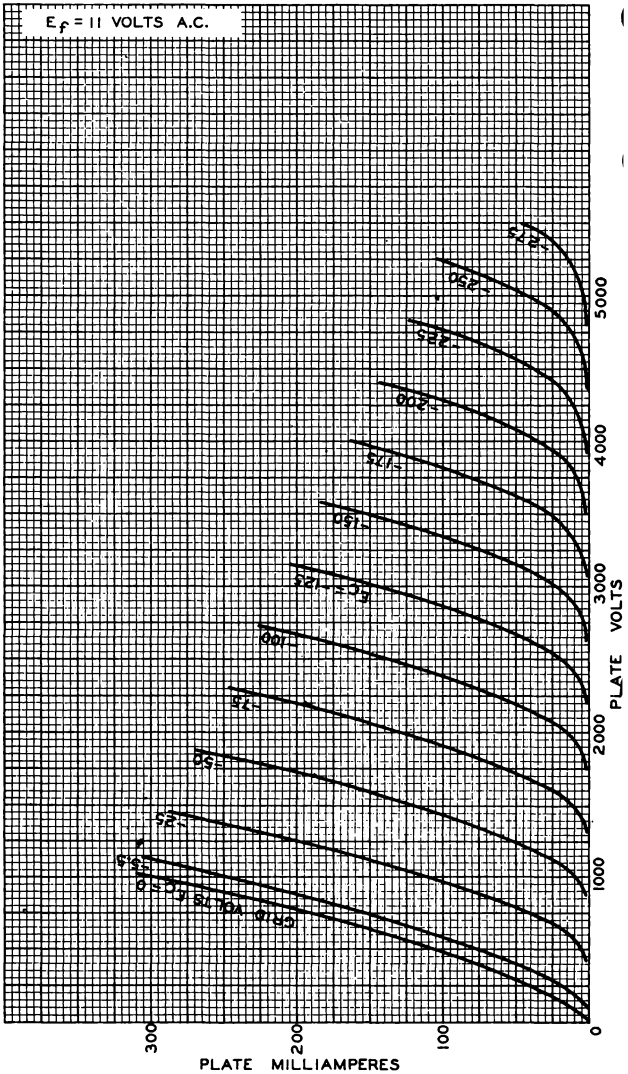


TYPICAL CHARACTERISTICS



849

AVERAGE PLATE CHARACTERISTICS



850

SCREEN GRID R-F POWER AMPLIFIER

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Amplification Factor	550 approx.	
Mutual Conductance for plate current of 19.5 ma.	2750	μmhos
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	0.25# max.	μμf
Input	17	μμf
Output	25	μμf
Maximum Overall Length		8-1/2"
Maximum Diameter		2-5/16"
Bulb		T-18
Cap		Medium Metal
Base		Jumbo 4-Large Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		1250 max.	volts
D-C Plate Current		150 max.	ma.
R-F Grid Current		6 max.	amp.
Plate Input		150 max.	watts
Screen Input		10 max.	watts
Plate Dissipation		100 max.	watts
Typical Operation:			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	1000	1250	volts
D-C Screen Voltage	175	175	volts
D-C Grid Voltage	-13	-13	volts
D-C Plate Current	100	110	ma.
Power Output	30	40	approx.watts

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		1000 max.	volts
D-C Grid Voltage		-400 max.	volts
D-C Plate Current		150 max.	ma.
D-C Grid Current		40 max.	ma.
R-F Grid Current		6 max.	amp.
Plate Input		150 max.	watts
Screen Input		7 max.	watts
Plate Dissipation		70 max.	watts
Typical Operation:			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	750	1000	volts
D-C Screen Voltage	125	140	volts
D-C Grid Voltage	-100	-100	volts
D-C Plate Current	140	125	ma.
D-C Grid Current *	40	40	approx.ma.
Driving Power *	10	10	approx.watts
Power Output	50	65	approx.watts

With external shielding. (continued on next page) * See next page.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

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SCREEN GRID R-F POWER AMPLIFIER

(continued from preceding page)

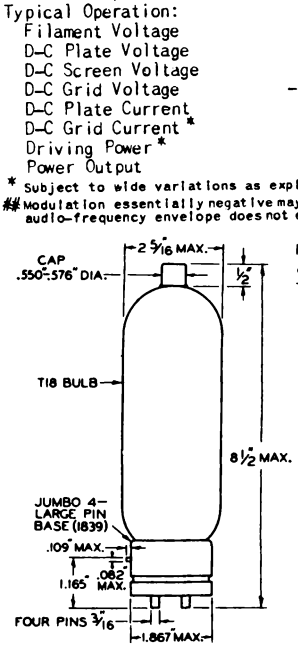
R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage			1250 max.	volts
D-C Grid Voltage			-400 max.	volts
D-C Plate Current			175 max.	ma.
D-C Grid Current			40 max.	ma.
R-F Grid Current			7.5 max.	amp.
Plate Input			220 max.	watts
Screen Input			10 max.	watts
Plate Dissipation			100 max.	watts
Typical Operation:				
Filament Voltage	10	10	10	a-c volts
D-C Plate Voltage	750	1000	1250	volts
D-C Screen Voltage	175	175	175	volts
D-C Grid Voltage	-150	-150	-150	volts
D-C Plate Current	160	160	160	ma.
D-C Grid Current *	35	35	35	approx.ma.
Driving Power *	10	10	10	approx.watts
Power Output	55	100	130	approx.watts

* Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

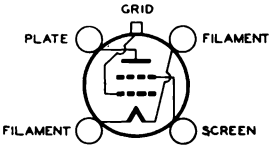
\#\# Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.



BOTTOM VIEW OF BASE

For use of the 850 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



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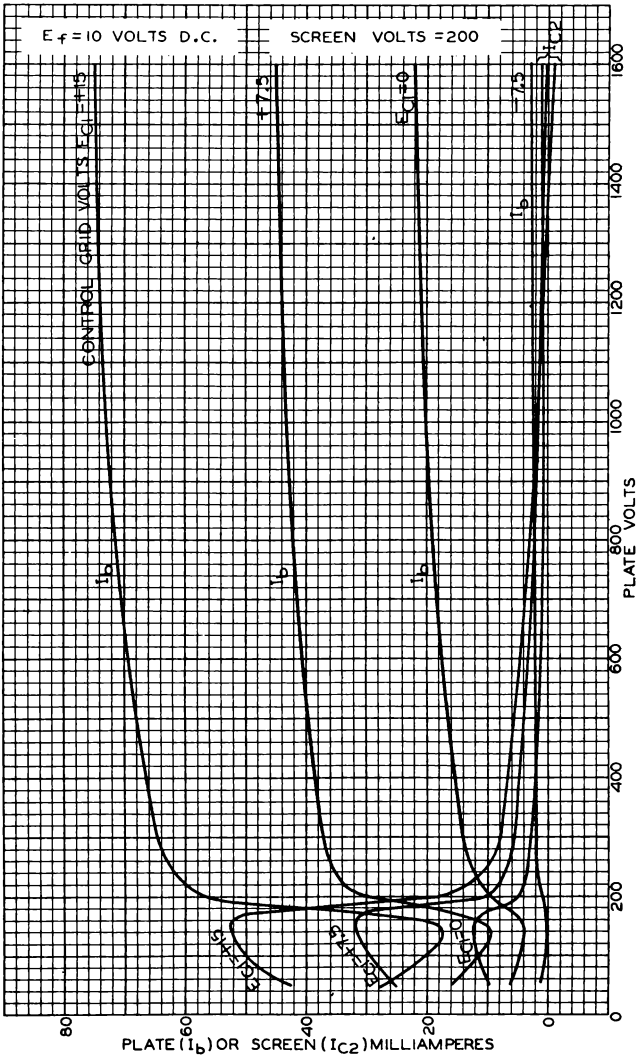
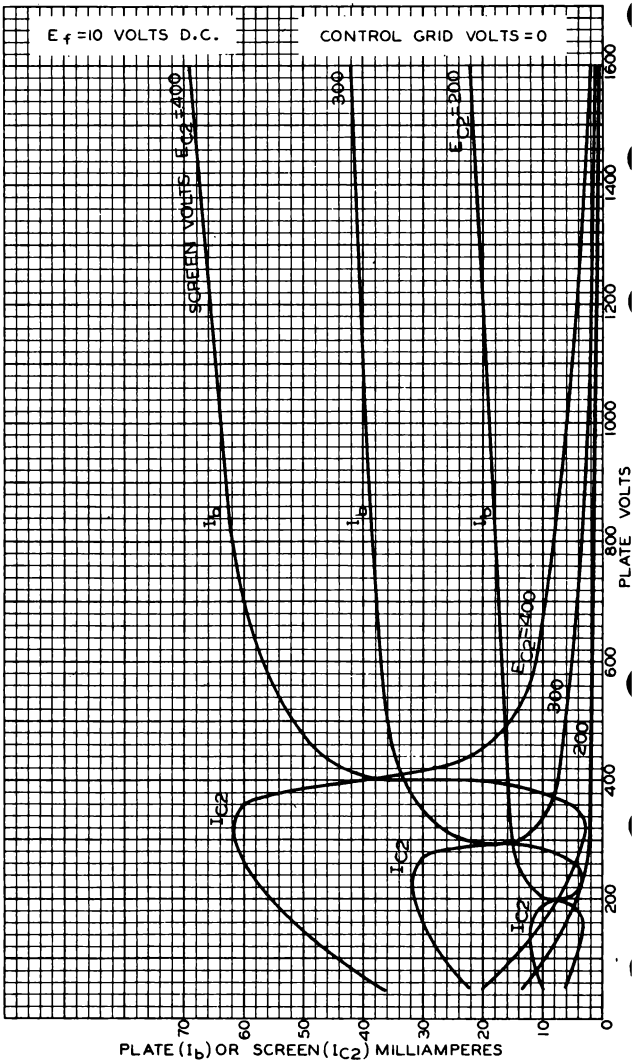
850

AVERAGE PLATE CHARACTERISTICS



850

AVERAGE PLATE CHARACTERISTICS



851

MODULATOR, A-F POWER AMPLIFIER, R-F POWER AMPLIFIER, OSCILLATOR

Filament	Thoriated Tungsten	
Voltage	11	a-c or d-c volts
Current	15.5	amp.
Amplification Factor	20.5	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	47	μμf
Grid to Filament	25.5	μμf
Plate to Filament	4.5	μμf
Overall Length		17-1/2" ± 1/8"
Maximum Diameter		6-1/8"
Bulb		T-48
Cap		No.1902
Base		No.3117

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class A

D-C Plate Voltage			2500 max.	volts
Plate Dissipation			600 max.	watts
Typical Operation:				
Filament Voltage	11	11	11	a-c volts
D-C Plate Voltage	1500	2000	2500	volts
D-C Grid Voltage	-49	-65	-92	volts
Peak A-F Grid Voltage	44	60	87	volts
D-C Plate Current	175	270	240	ma.
Plate Resistance	1800	1500	1600	ohms
Load Resistance	3700	3100	5000	ohms
Power Output	46	100	160	watts

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage			3000 max.	volts
Max-Signal D-C Plate Current*			1 max.	amp.
Max-Signal Plate Input*			2250 max.	watts
Plate Dissipation*			750 max.	watts
Typical Operation - 2 tubes:				
Unless otherwise specified, values are for 2 tubes.				
Filament Voltage	11	11	11	a-c volts
D-C Plate Voltage	2000	2500	3000	volts
D-C Grid Voltage	-85	-111	-135	volts
Peak A-F Grid-to-Grid Volt.	500	490	490	volts
Zero-Signal D-C Plate Cur.	0.12	0.12	0.11	amp.
Max-Signal D-C Plate Cur.	1.7	1.4	1.2	amp.
Load Resistance (per tube)	650	1000	1400	ohms
Effective Load Resistance (plate to plate)	2600	4000	5600	ohms
Max-Signal Driving Power	20	12	6	approx. watts
Max-Signal Power Output	2.2	2.3	2.4	approx. kw

* Averaged over any audio frequency cycle of sine-wave form. ←

← Indicates a change

851

MODULATOR, A-F POWER AMPLIFIER, R-F POWER AMPLIFIER, OSCILLATOR

(continued from preceding page)

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			2500	max.	volts
D-C Plate Current			0.75	max.	amp.
R-F Grid Current			8	max.	amp.
Plate Input			1100	max.	watts
Plate Dissipation			750	max.	watts
Typical Operation:					
Filament Voltage	11	11	11	a-c	volts
D-C Plate Voltage	1500	2000	2500		volts
D-C Grid Voltage	-60	-85	-110		volts
→ Peak R-F Grid Voltage	150	140	135		volts
D-C Plate Current	0.62	0.475	0.39		amp.
Driving Power ** °	40	25	20		approx.watts
Power Output	275	300	325		approx.watts

° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			2000	max.	volts
D-C Grid Voltage			-500	max.	volts
D-C Plate Current			1	max.	amp.
D-C Grid Current			0.2	max.	amp.
R-F Grid Current			8	max.	amp.
Plate Input			1800	max.	watts
Plate Dissipation			500	max.	watts
Typical Operation:					
Filament Voltage		11	11	a-c	volts
D-C Plate Voltage		1500	2000		volts
D-C Grid Voltage		-250	-300		volts
Peak R-F Grid Voltage		475	525		volts
D-C Plate Current		0.9	0.85		amp.
D-C Grid Current **		0.15	0.125		approx.amp.
Driving Power **		75	65		approx.watts
Power Output		900	1250		approx.watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

*Key-down conditions per tube without modulation**

D-C Plate Voltage			2500	max.	volts
→ D-C Grid Voltage			-500	max.	volts
D-C Plate Current			1	max.	amp.
D-C Grid Current			0.2	max.	amp.
R-F Grid Current			10	max.	amp.
Plate Input			2500	max.	watts
Plate Dissipation			750	max.	watts
Typical Operation:					
Filament Voltage	11	11	11	a-c	volts
D-C Plate Voltage	1500	2000	2500		volts

*, ** See next page. ← Indicates a change

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

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MODULATOR, A-F POWER AMPLIFIER, R-F POWER AMPLIFIER, OSCILLATOR

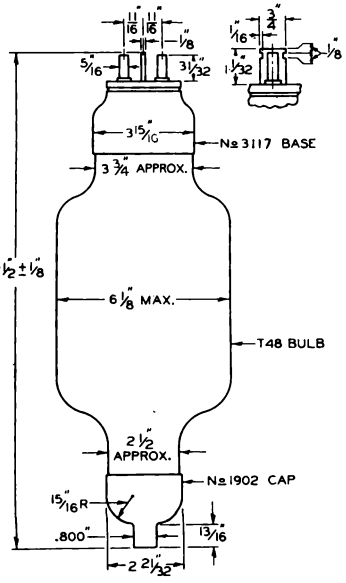
(continued from preceding page)

D-C Grid Voltage	-150	-200	-250	approx.volts
Peak R-F Grid Voltage	375	425	450	approx.volts
D-C Plate Current	0.9	0.9	0.9	amp.
D-C Grid Current **	0.15	0.12	0.1	approx.amp.
Driving Power **	55	50	45	approx.watts
Power Output	900	1250	1700	approx.watts

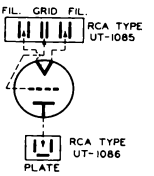
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

Modulation essentially negative may be used if the positive peak of the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

For use of the 851 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.



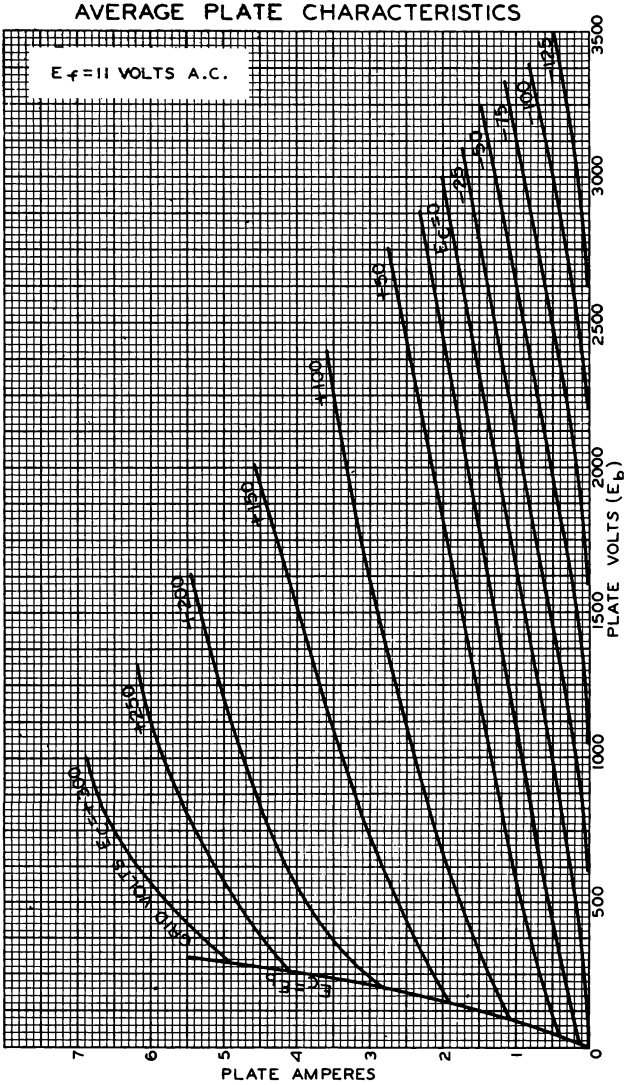
TUBE SYMBOL & CONNECTIONS TO END-MOUNTINGS.



851

851

AVERAGE PLATE CHARACTERISTICS



JUNE 3, 1935

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4454

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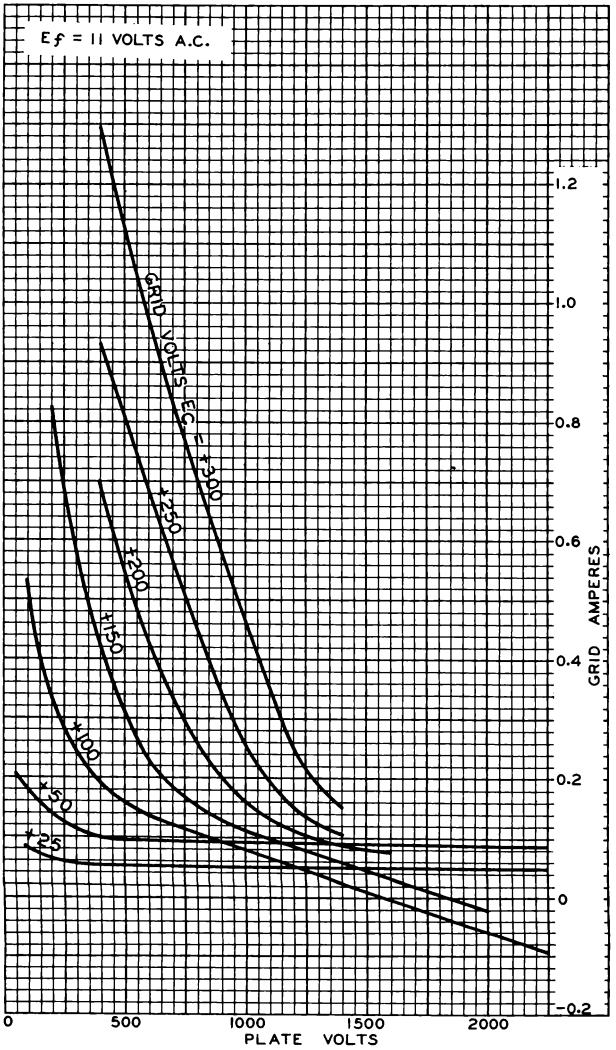
TYPICAL CHARACTERISTICS



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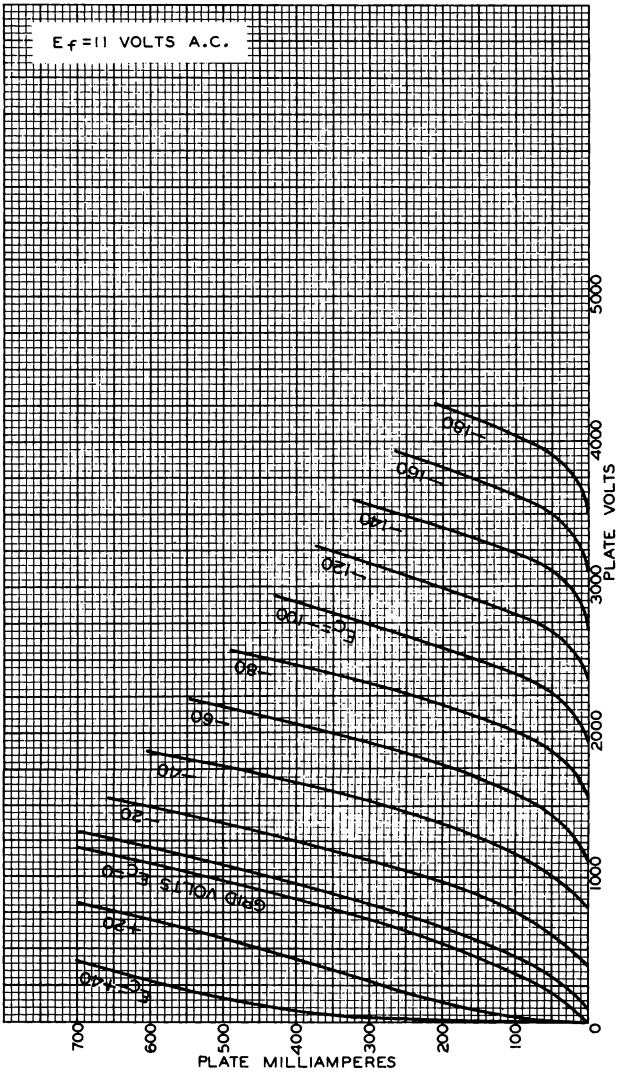
AVERAGE PLATE CHARACTERISTICS



AUG. 29, 1928

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92S-5497

857-B

HALF-WAVE MERCURY-VAPOR RECTIFIER

GENERAL DATA

Electrical:

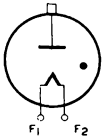
Filamentary Cathode, Coated:

Voltage	5 ± 5%	ac volts
Current	30	amp
Minimum heating time at rated voltage	60	sec
Peak Tube Voltage Drop (Approx.)	15	volts

Mechanical:

Terminal Connections:

F_1 - Filament (Insulated)



F_2 - Filament, Cathode Shield, Shell (Anode Return)

Cap - Anode

Mounting Position	Vertical with filament end down
Maximum Overall Length (Including flexible leads)	29-7/8"
Seated Length	19-1/2" ± 3/8"
Maximum Diameter	7-1/8"
Weight (Approx.)	4 lbs
Bulb	GT-56
Cap	Skirted Large (JETEC No.C1-10)
Base	Terminal-Support Shell (JETEC No.F0-2)

Temperature Control:

Heating--When the ambient temperature is so low that the normal rise of condensed-mercury temperature above the ambient temperature will not bring the condensed-mercury temperature up to the minimum value of the operating ranges specified under *Maximum Ratings*, some form of heat-conserving enclosure or auxiliary heater will be required.

Cooling--When the operating conditions are such that the maximum value of the operating condensed-mercury temperature range is exceeded, provision should be made for forced-air cooling sufficient to prevent exceeding the maximum value.

Temperature Rise of Condensed-Mercury to Equilibrium Above Ambient Temperature (Approx.):*

No load	11.5	°C
Full load	15	°C

* with filament volts = 4.75 and no heat-conserving enclosure.

← Indicates a change.

857-B

HALF-WAVE MERCURY-VAPOR RECTIFIER

HALF-WAVE RECTIFIER

Maximum Ratings, *Absolute Values: For supply frequency of 60 cps*

	Operating Condensed-Mercury Temperature Range 25° to 60°C	30° to 40°C	
PEAK INVERSE ANODE VOLTAGE	10000 max.	22000 max.	volts
ANODE CURRENT:			
Peak	40 max.	40 max.	amp
Average**	10 max.	10 max.	amp
Fault, for duration of 0.2 second max.	400 max.	400 max.	amp

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	–	33	amp
Critical Anode Voltage	2	–	100	volts
Peak Tube Voltage Drop	3	–	25	volts

Note 1: With 5 volts rms on filament.

Note 2: With 4.75 volts rms on filament, and condensed-mercury temperature at 25°C, or above.

Note 3: With 5 volts rms on filament, condensed-mercury temperature of 35° ± 5°C, peak anode current of 100 amperes provided by half-cycle pulse from a 60-cps sine wave and recurring approximately once a second. Tube drop is measured by an oscilloscope connected between anode and center tap of filament transformer.

OPERATING CONSIDERATIONS

X-Ray Warning. X-rays are produced when the 857-B is operated with a peak inverse voltage above 16000 volts (absolute value). These rays can constitute a health hazard unless the tube is adequately shielded for X-ray radiation. Although relatively simple shielding should prove adequate, make sure that it provides the required protection to the operator.

Shields and rf filter circuits should be provided for the 857-B if it is subjected to extraneous high-frequency fields during operation. These fields tend to produce breakdown effects in mercury vapor and are detrimental to tube life and performance. When shields are used, special attention must be given to providing adequate ventilation and to maintaining normal condensed-mercury temperature. Rf filters are employed to prevent damage caused by rf currents which might otherwise be fed back into the rectifier tubes.

** Averaged over any period of 30 seconds maximum.

→ Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

857-B

HALF-WAVE MERCURY-VAPOR RECTIFIER

For Circuit Figures, see Front of this Section

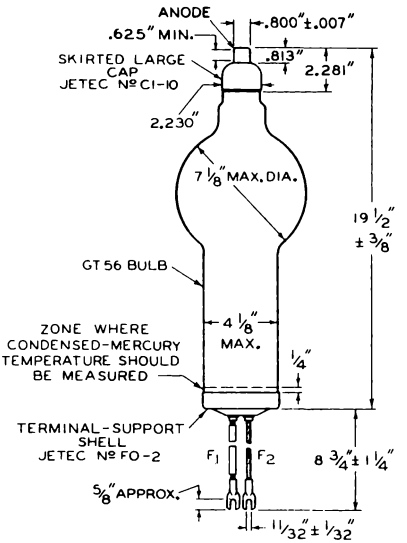
CIRCUIT	MAX. TRANS. SEC. VOLTS (RMS) E	APPROX. DC OUTPUT VOLTS TO FILTER Eav	MAX. DC OUTPUT AMPERES Iav		MAX. DC OUTPUT KW TO FILTER Pdc	
Fig. 1 **Half-Wave** **Single-Phase** In-Phase Operation	15400□ 7000▲	7000 3200	10 10		70 32	
Fig. 2 **Full-Wave** **Single-Phase** In-Phase Operation	7700□ 3500▲	7000 3200	20 20		140 64	
Fig. 3 **Series** **Single-Phase** In-Phase Operation	15400□ 7000▲	14000 6400	20 20		280 128	
Fig. 4 **Half-Wave** **Three-Phase** In-Phase Operation	8900□ 4000▲	10500 4800	30 30		315 144	
Fig. 5 **Parallel** **Three-Phase** Quadrature Operation	8900□ 4000▲	10500 4800	60 60		630 288	
Fig. 6 **Series** **Three-Phase** Quadrature Operation	8900□ 4000▲	21000 9600	30 30		630 288	
Fig. 7 **Half-Wave** **Four-Phase** Quadrature Operation	7700□ 3500▲	10100 4600	*Resistive Load* 36 36	*Inductive Load* 40 40	*Resistive Load* 364 166	*Inductive Load* 404 184
Fig. 8 **Half-Wave** **Six-Phase** Quadrature Operation	7700□ 3500▲	10500 4800	*Resistive Load* 38 38	*Inductive Load* 40 40	*Resistive Load* 399 182	*Inductive Load* 420 192

□ For maximum peak inverse anode voltage of 22000 volts and maximum average current of 10 amperes.

▲ For maximum peak inverse anode voltage of 10000 volts and maximum average current of 10 amperes.

857-B

HALF-WAVE MERCURY-VAPOR RECTIFIER



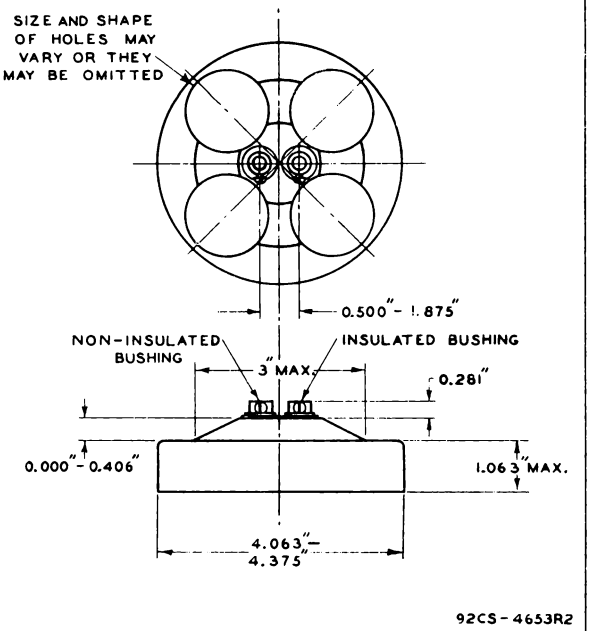
F_1 = FILAMENT (INSULATED)
F_2 = FILAMENT, CATHODE SHIELD, AND SHELL (ANODE RETURN)

92CM-4649R3

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

857-B

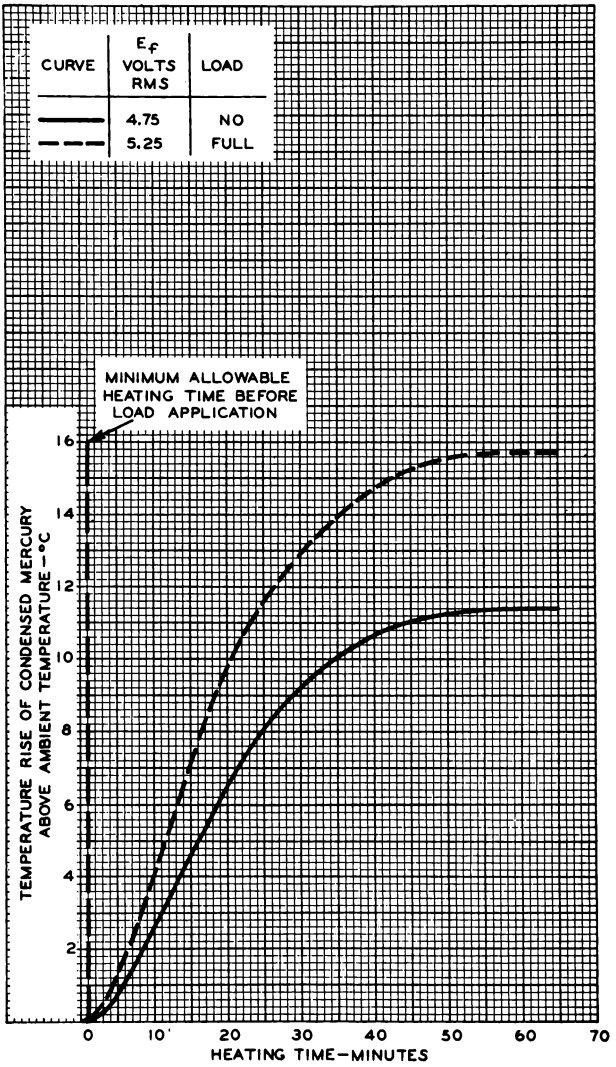
HALF-WAVE MERCURY-VAPOR RECTIFIER



JETEC No. FO-2
RCA No. 3911

857-B

RATE OF RISE OF COND.-MERCURY TEMPERATURE



858

OSCILLATOR, R-F POWER AMPLIFIER

(WATER COOLED)

Filament	Tungsten		
Voltage	22	a-c or d-c	volts
Current	52		amp.
Amplification Factor	42		
Direct Interelectrode Capacitances (approx.):			
Grid to Plate	18		μμf
Grid to Filament	16		μμf
Plate to Filament	2		μμf
Maximum Overall Length			24-1/2"
Maximum Radius			7-1/2"
Base			None
Water Jacket			UT-1290

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in front of book.

A-F POWER AMPLIFIER - Class B

D-C Plate Voltage	20000 max.	volts
Max-Signal D-C Plate Current *	2.0 max.	amp.
Max-Signal D-C Plate Input *	40 max.	kw
Plate Dissipation *	20 max.	kw
Typical Operation - 2 tubes:		
Unless otherwise specified, values are for 2 tubes.		
Filament Voltage	22 d-c	volts
D-C Plate Voltage	12000	volts
D-C Grid Voltage	-140	volts
Peak A-F Grid-to-Grid Voltage	2600	volts
Zero-Signal D-C Plate Cur.	0.5	amp.
Max-Signal D-C Plate Cur.	3.6	amp.
Load Resistance (per tube)	1800	ohms
Effective Load Res. (plate to plate)	7200	ohms
Max-Signal Driving Power	115	approx. watts
Max-Signal Power Output	26.5	approx. kw

Averaged over any audio-frequency cycle.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	20000 max.	volts
D-C Plate Current	1.0 max.	amp.
R-F Grid Current	48 max.	amp.
Plate Input	20 max.	kw
Plate Dissipation	15 max.	kw

Typical Operation:

Filament Voltage	22	22	22 d-c	volts
D-C Plate Voltage	10000	14000	18000	volts
D-C Grid Voltage	-100	-200	-300	volts
Peak R-F Grid Voltage	400	575	725	volts
D-C Plate Current	0.5	0.7	0.9	amp.

(continued on next page)

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OSCILLATOR, R-F POWER AMPLIFIER

(continued from preceding page)

Driving Power ** °	25	70	85	approx.watts
Power Output	1.5	3.3	5.6	approx.kw

° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			12000 max.	volts
D-C Grid Voltage			-3000 max.	volts
D-C Plate Current			1.0 max.	amp.
D-C Grid Current			0.25 max.	amp.
R-F Grid Current			48 max.	amp.
Plate Input			12 max.	kw
Plate Dissipation			10 max.	kw
Typical Operation:				
Filament Voltage	22	22	22	a-c volts
D-C Plate Voltage	8000	10000	12000	volts
D-C Grid Voltage	-900	-950	-1000	volts
Peak R-F Grid Voltage	1875	1950	1950	volts
D-C Plate Current	0.90	0.90	0.95	amp.
D-C Grid Current **	0.10	0.09	0.08	approx.amp.
Driving Power **	180	200	150	approx.watts
Power Output	5	6	8	approx.kw

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage			20000 max.	volts
D-C Grid Voltage			-3000 max.	volts
D-C Plate Current			2.0 max.	amp.
D-C Grid Current			0.25 max.	amp.
R-F Grid Current			60 max.	amp.
Plate Input			40 max.	kw
Plate Dissipation			20 max.	kw
Typical Operation:				
Filament Voltage	22	22	22	a-c volts
D-C Plate Voltage	10000	15000	18000	volts
D-C Grid Voltage	-1000	-1100	-1200	volts
Peak R-F Grid Voltage	2200	2500	2600	volts
D-C Plate Current	1.4	1.8	1.8	amp.
D-C Grid Current **	0.13	0.10	0.10	approx.amp.
Driving Power **	275	250	250	approx.watts
Power Output	9	18	22.4	approx.kw

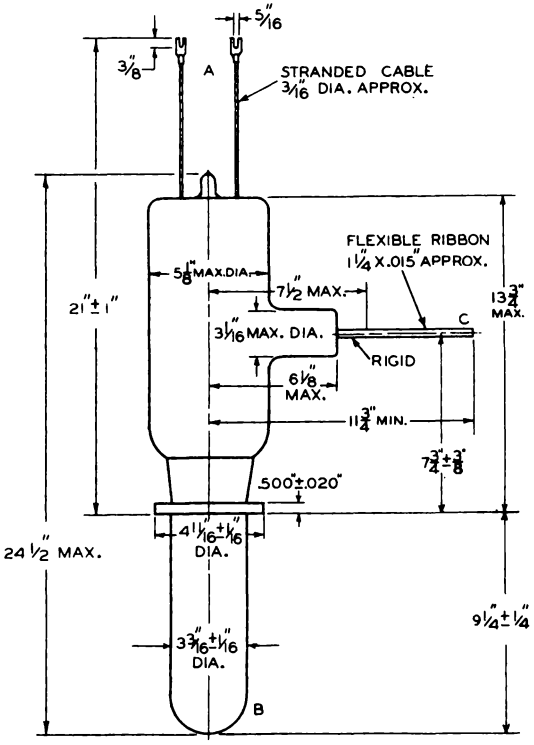
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

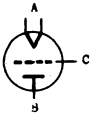
For use of the 858 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

858
OSCILLATOR
R-F POWER AMPLIFIER



TUBE SYMBOL
AND
TERMINAL CONNECTIONS

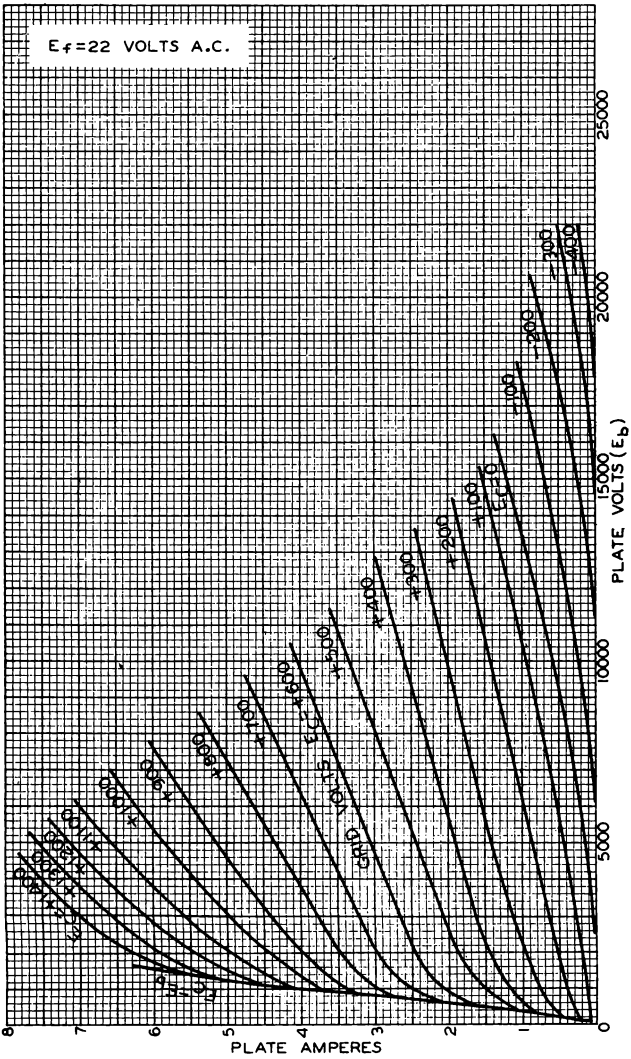


A – Filament
B – Plate
C – Grid

858
OSCILLATOR, R-F POWER AMPLIFIER

THE FILAMENT CHARACTERISTIC AND THE FILAMENT EMISSION CHARACTERISTIC FOR THE 858 ARE THE SAME AS THOSE SHOWN FOR THE 207.

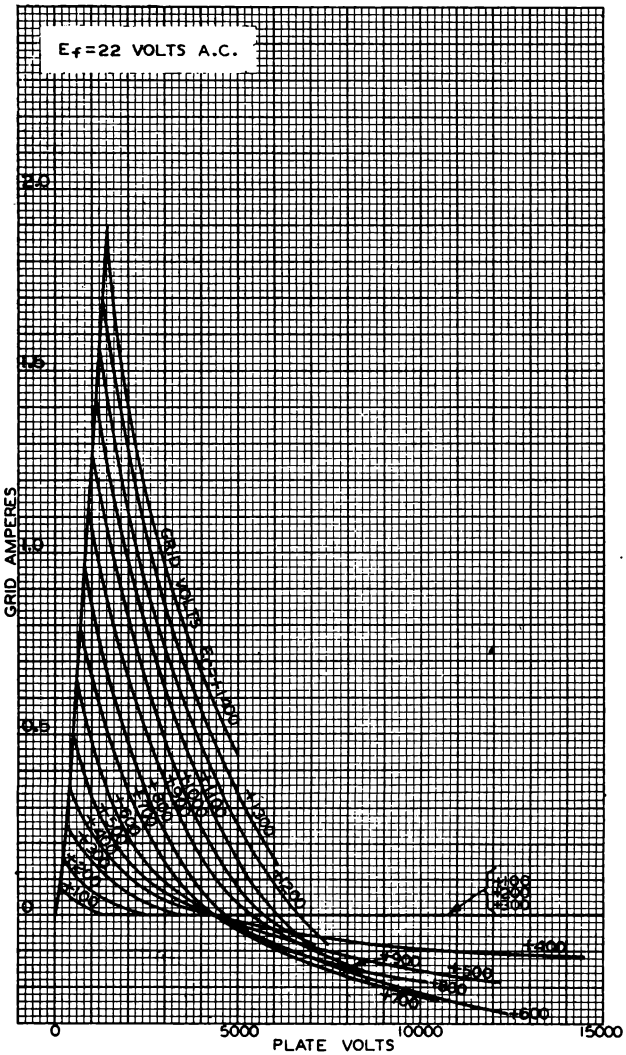
AVERAGE PLATE CHARACTERISTICS



858

858

TYPICAL CHARACTERISTICS



JUNE 4, 1934

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

925—5547

860

POWER TETRODE

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:

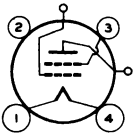
Voltage	10	ac or dc volts
Current	3.25	amp
Transconductance, for plate current of 16 ma	1100	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate	0.08 max.*	μμf
Input	7.75	μμf
Output	7.5	μμf

* With external shielding.

Mechanical:

Mounting Position	Vertical, base down
Maximum Overall Length	8-3/4"
Maximum Radius	4-1/4"
Bulb	GT-30, with arm
Base	Medium-Metal-Shell Small 4-Pin, Bayonet
Basing Designation for BOTTOM VIEW	3F

Pin 1 - Filament
Pin 2 - No Connection
Pin 3 - Screen
Pin 4 - Filament



Top Lead- Grid
Side Lead- Plate

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings. *Absolute Values:*

D-C Plate Voltage		3000 max.	volts
D-C Screen Voltage		500 max.	volts
D-C Plate Current		85 max.	ma.
Plate Input		150 max.	watts
Screen Input		10 max.	watts
Plate Dissipation		100 max.	watts
Typical Operation:			
D-C Plate Voltage	2000	3000	volts
D-C Screen Voltage □	300	300	volts
D-C Grid Voltage	-50	-50	volts
D-C Plate Current	60	43	ma.
Power Output	30	40 approx.	watts

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

D-C Plate Voltage	2000 max.	volts

□ Use of series screen resistor is not recommended.

860

POWER TETRODE

D-C Screen Voltage			500 max.	volts
D-C Grid Voltage			-800 max.	volts
D-C Plate Current			85 max.	ma.
D-C Grid Current			40 max.	ma.
Plate Input			170 max.	watts
Screen Input			6.7 max.	watts
Plate Dissipation			67 max.	watts
Typical Operation:				
D-C Plate Voltage	1500	1800	2000	volts
D-C Screen Voltage ▲	60000	80000	100000	ohms
	300	300	220	volts
D-C Grid Voltage ¶	7500	7500	5300	ohms
	-225	-225	-200	volts
Peak R-F Grid Voltage	-	-	500	volts
D-C Plate Current	70	67	85	ma.
D-C Screen Current	-	-	25	ma.
D-C Grid Current **	30	30	38	approx.ma.
Driving Power **	15	15	17	approx.watts
Power Output	45	60	105	approx.watts

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation#

Maximum Ratings, *Absolute Values*:

D-C Plate Voltage			3000 max.	volts
D-C Screen Voltage			500 max.	volts
D-C Grid Voltage			-800 max.	volts
D-C Plate Current			150 max.	ma.
D-C Grid Current			40 max.	ma.
Plate Input			300 max.	watts
Screen Input			10 max.	watts
Plate Dissipation			100 max.	watts
Typical Operation:				
D-C Plate Voltage	1500	2000	2500	3000	volts
D-C Screen Voltage □	300	300	300	300	volts
D-C Grid Voltage ●	10000	10000	10000	10000	ohms
	-150	-150	-150	-150	volts
D-C Plate Current	90	90	90	85	ma.
D-C Grid Current **	15	15	15	15	approx.ma.
Driving Power **	7	7	7	7	approx.watts
Power Output	60	100	135	165	approx.watts

▲ Obtained from modulated plate-voltage supply through resistor or from modulated fixed supply.

¶ Obtained by grid-leak resistor or by partial self-bias methods.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

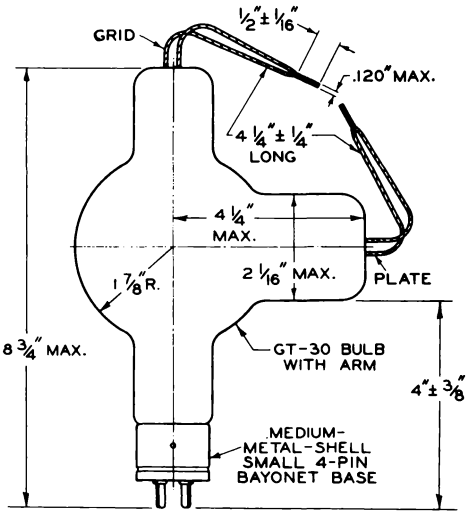
□ Use of series resistor is not recommended.

● Obtained by grid-leak resistor or other self- or fixed-bias method.

860

POWER TETRODE

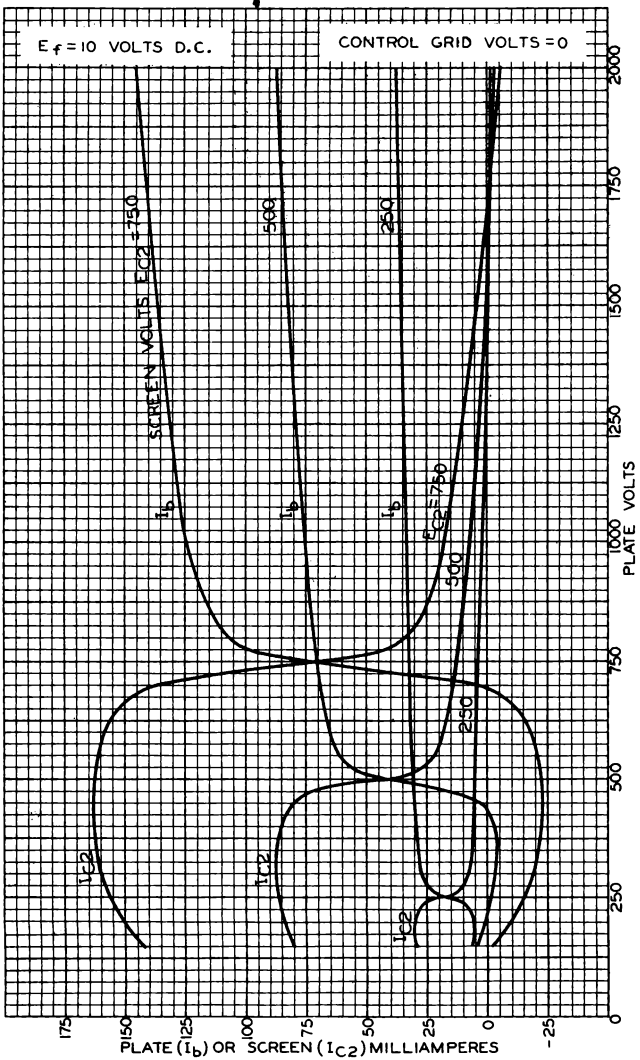
For use of the 860 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.



92CM-4318R4

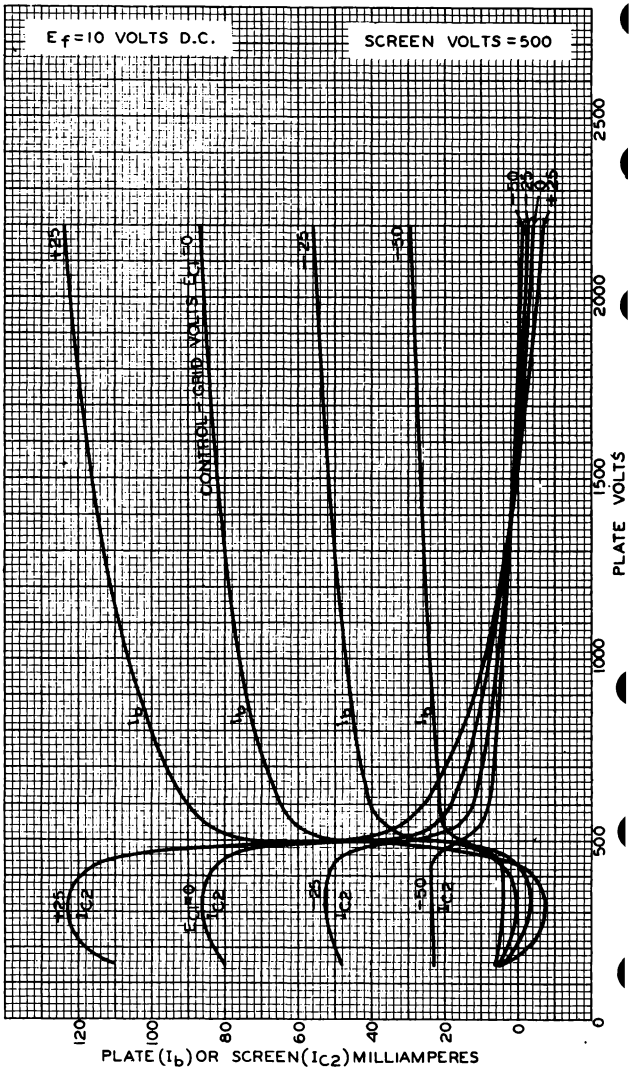
860

AVERAGE PLATE CHARACTERISTICS



860

AVERAGE PLATE CHARACTERISTICS



APR. 19, 1934

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

925-5309

861

SCREEN GRID R-F POWER AMPLIFIER

Filament	Thoriated Tungsten	
Voltage	11	a-c or d-c volts
Current	10	amp.
Amplification Factor	300 approx.	
Transconductance for plate current of 130 ma.	2100	μmhos
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	0.10*maximum	μμf
Input	14.5	μμf
Output	10.5	μμf
Overall Length		17-3/32" ± 1/8"
Maximum Radius		6-5/8"
Bulb		GT-56 with arm
Cap (opposite filament base)		No.3909
Cap (on side of bulb)		No.3910
Base		No.3503
RCA End-Mountings		Types UT-1085, UT-1086 ←

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage			3500 max.	volts
D-C Screen Voltage			750 max.	volts ←
D-C Plate Current			250 max.	ma.
Plate Input			600 max.	watts
Screen Input			35 max.	watts
Plate Dissipation			400 max.	watts
Typical Operation:				
D-C Plate Voltage	2500	3000	3500	volts
D-C Screen Voltage □	500	500	500	volts
D-C Grid Voltage	-60	-60	-60	volts
Peak R-F Grid Voltage	250	245	215	volts
D-C Plate Current	190	175	150	ma.
D-C Grid Current **	4	4	4	approx.ma.
Driving Power ° **	20	15	15	approx.watts
Power Output	140	160	175	approx.watts

□ Use of a series resistor is not recommended.
° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage	3000 max.	volts
D-C Screen Voltage	750 max.	volts ←
D-C Grid Voltage	-1000 max.	volts
D-C Plate Current	300 max.	ma.
D-C Grid Current	75 max.	ma.
Plate Input	650 max.	watts
Screen Input	30 max.	watts
Plate Dissipation	270 max.	watts

* With external shielding.
** See next page.
← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

861

SCREEN GRID R-F POWER AMPLIFIER

(continued from preceding page)

Typical Operation:				
D-C Plate Voltage	2000	2500	3000	volts
D-C Screen Voltage△	30000	50000	70000	ohms
	425	400	375	volts
→ D-C Grid Voltage ¶	3900	3800	3600	ohms
	-250	-225	-200	volts
Peak R-F Grid Voltage	675	625	575	volts
D-C Plate Current	250	220	200	ma.
D-C Grid Current **	65	60	55	approx.ma.
Driving Power **	45	40	35	approx.watts
Power Output	285	340	400	approx.watts

△ Obtained from modulated fixed supply or modulated plate-voltage supply through resistor.
¶ Obtained by grid-leak resistor or partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation#

D-C Plate Voltage	3500 max.	volts
→ D-C Screen Voltage	750 max.	volts
D-C Grid Voltage	-1000 max.	volts
D-C Plate Current	350 max.	ma.
D-C Grid Current	75 max.	ma.
Plate Input	1200 max.	watts
Screen Input	35 max.	watts
Plate Dissipation	400 max.	watts

Typical Operation:				
D-C Plate Voltage	2000	3000	3500	volts
D-C Screen Voltage □	500	500	500	volts
→ D-C Grid Voltage ●	6300	6300	6300	ohms
	-250	-250	-250	volts
Peak R-F Grid Voltage	725	725	725	volts
D-C Plate Current	300	300	300	ma.
D-C Screen Current	60	50	40	ma.
D-C Grid Current **	40	40	40	approx.ma.
Driving Power **	30	30	30	approx.watts
Power Output	400	600	700	approx.watts

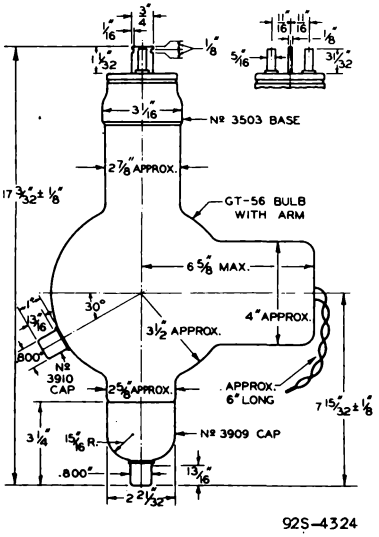
● Obtained by grid-leak resistor or other fixed- or self-bias method.
□ Use of series resistor is not recommended.
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

For use of the 861 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

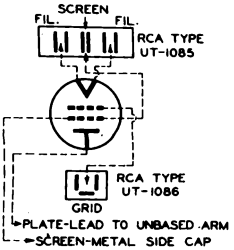
← indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

861
SCREEN GRID R-F POWER AMPLIFIER



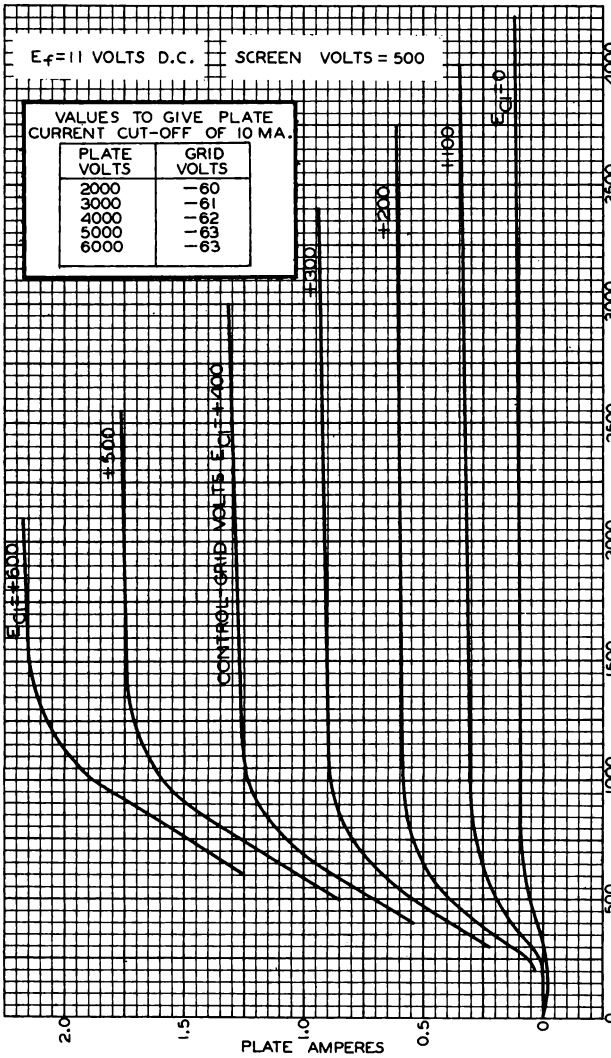
TUBE SYMBOL & CONNECTIONS TO END-MOUNTINGS



NOTE:- SCREEN CONNECTION TO BOTH BLADE AND METAL SIDE CAP

861

AVERAGE PLATE CHARACTERISTICS



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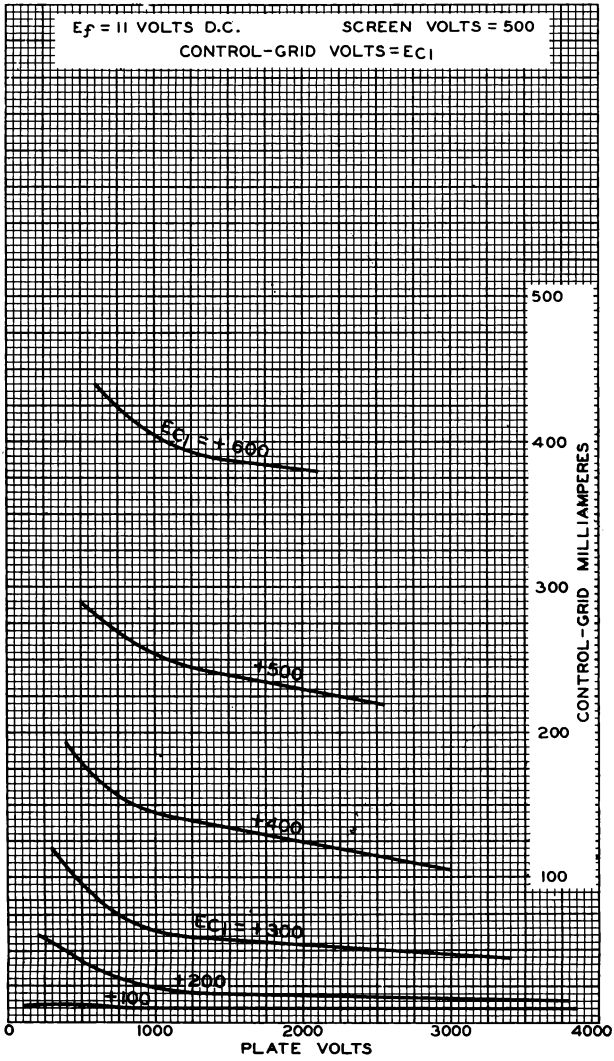
AVERAGE CHARACTERISTICS



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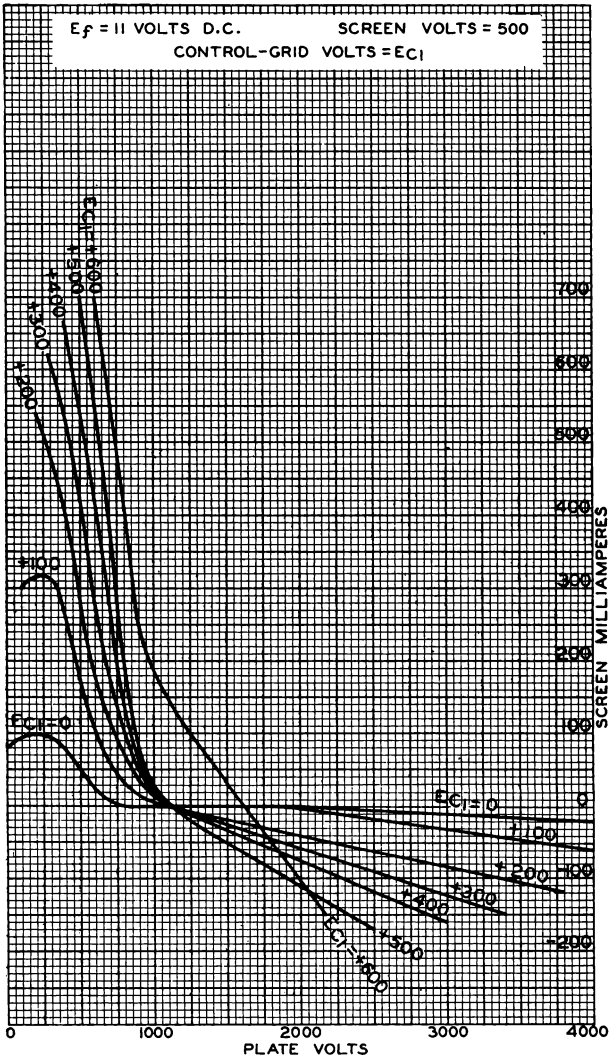
861

AVERAGE CHARACTERISTICS



JUNE 22, 1934

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-5549

862-A

TRANSMITTING TRIODE

WATER & FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament: Tungsten

Voltage . . . . . 33 . . . . . a-c or d-c volts

Current . . . . . 207 . . . . . amp.

Starting – The current should never exceed 400 amperes, even momentarily.

Amplification Factor. . . . 45

Direct Interelectrode Capacitances (Approx.):

Grid to Plate . . . . . 70 . . . . . μμf

Grid to Filament. . . . . 53 . . . . . μμf

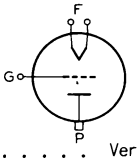
Plate to Filament . . . . 4.5 . . . . . μμf

Physical:

Terminal Legend:

F – Stranded Filament Terminal

G – Ribbon Grid Terminal



P – Water-cooled Plate Terminal

Mounting Position . . . . . Vertical only, glass end up

Maximum Overall Length. . . . . 60-3/8"

Greatest Radius . . . . . 10"

Base (with nozzle for air-cooling of filament seal) No.3908

Water Jacket (with nozzle for air-cooling of bulb) Type UT-1289-A

Gasket. . . . . RCA Stock No.17879

Cooling – *Water flow* of 15 to 25 gallons per minute must start before application of any voltages and continue for at least 10 minutes after removal of all voltages. Water temperature must not exceed 70°C at socket outlet under any conditions of operation. *Air flow* of 15 cubic feet per minute in bulb nozzle and 3 cubic feet per minute in filament-seal nozzle is required before the application of any voltages and must continue for at least 10 minutes after removal of voltages to limit the glass temperature to 150°C at the hottest part.

This tube can often be operated at reduced filament voltage as explained on sheet TYPES OF CATHODES in General Section.

A-F POWER AMPLIFIER & MODULATOR – Class B

Maximum Ratings, ***Absolute Values:***

D-C PLATE VOLTAGE . . . . . 15000 max. . volts

MAX.-SIGNAL D-C PLATE CURRENT*. . . . . 7.5 max. . amp.

MAX.-SIGNAL PLATE INPUT*. . . . . 100 max. . . kw

PLATE DISSIPATION*. . . . . 50 max. . . kw

Typical Operation:

Unless otherwise specified, values are for 2 tubes

D-C Plate Voltage . . . . . 12000 . . . volts

D-C Grid Voltage° . . . . . 0 . . . volts

Peak A-F Grid-to-Grid Voltage . . . . . 2000 . . . volts

Zero-Signal D-C Plate Current . . . . . 3 . . . amp.

Max.-Signal D-C Plate Current . . . . . 13 . . . amp.

Effective Load Res. (plate to plate). . 1800 . . . ohms

Max.-Signal Driving Power . . . . . 450 approx. watts

Max.-Signal Power Output. . . . . 90 approx. kw

* Averaged over any audio-frequency cycle of sine-wave form.

° For a-c filament supply.

862-A

862-A

TRANSMITTING TRIODE

(continued from preceding page)

R-F POWER AMPLIFIER – Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

D-C PLATE VOLTAGE	20000 max.	volts
D-C PLATE CURRENT	5 max.	amp.
PLATE INPUT	100 max.	kw
PLATE DISSIPATION	75 max.	kw

Typical Operation:

D-C Plate Voltage	12000	15000	18000	volts
D-C Grid Voltage°	-100	-150	-200	volts
Peak R-F Grid Voltage	500	625	750	volts
D-C Plate Current	2.8	3.5	4.2	amp.
Driving Power # **	0.5	0.75	1.1	approx. kw
Power Output	11	17.5	25	approx. kw

** At crest of a-f cycle with modulation factor of 1.0.
° For a-c filament supply.

PLATE MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

D-C PLATE VOLTAGE	12000 max.	volts
D-C GRID VOLTAGE	-3000 max.	volts
D-C PLATE CURRENT	5 max.	amp.
D-C GRID CURRENT	1.25 max.	amp.
PLATE INPUT	60 max.	kw
PLATE DISSIPATION	50 max.	kw

Typical Operation:

D-C Plate Voltage	8000	10000	12000	volts
D-C Grid Voltage	-700	-750	-800	volts
Peak R-F Grid Voltage	1700	1850	2000	volts
D-C Plate Current	4	4.5	5	amp.
D-C Grid Current #	1	1	1	approx. amp.
Driving Power #	1.7	1.85	2	approx. kw
Power Output	24	34	45	approx. kw

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation **

Maximum Ratings, ***Absolute Values:***

D-C PLATE VOLTAGE	20000 max.	volts
D-C GRID VOLTAGE	-3000 max.	volts
D-C PLATE CURRENT	10 max.	amp.
D-C GRID CURRENT	1 max.	amp.
PLATE INPUT	200 max.	kw
PLATE DISSIPATION	100 max.	kw

#, **: See next page.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

862-A

TRANSMITTING TRIODE

(continued from preceding page)

Typical Operation:

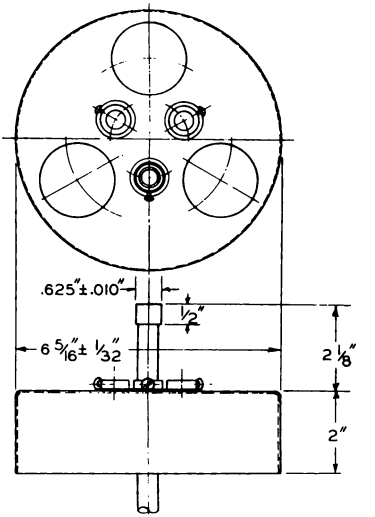
D-C Plate Voltage	12000	15000	18000	
D-C Grid Voltage.	-800	-900	-1000	. . . volts
Peak R-F Grid Voltage . .	2050	2300	2550	. . . volts
D-C Plate Current	6.25	7.5	8.33	. . . volts
D-C Grid Current #	0.8	0.85	0.9	approx. amp.
Driving Power #	1.6	2	2.4	approx. kw
Power Output.	50	75	100	approx. kw

Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

Data on operating frequencies for the 862-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

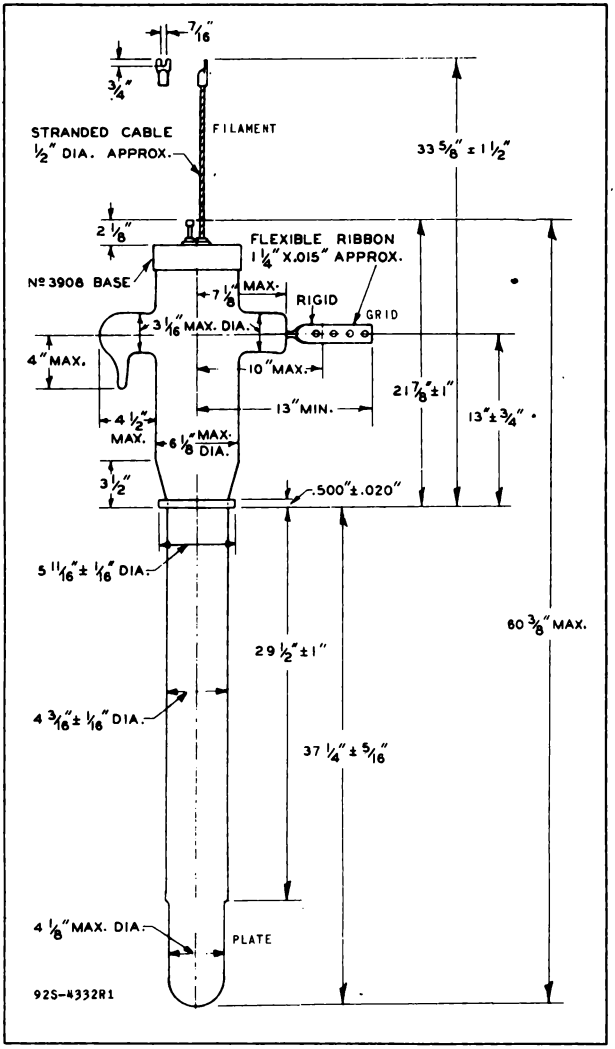
Nº 3908 BASE OUTLINE



92CS-6577

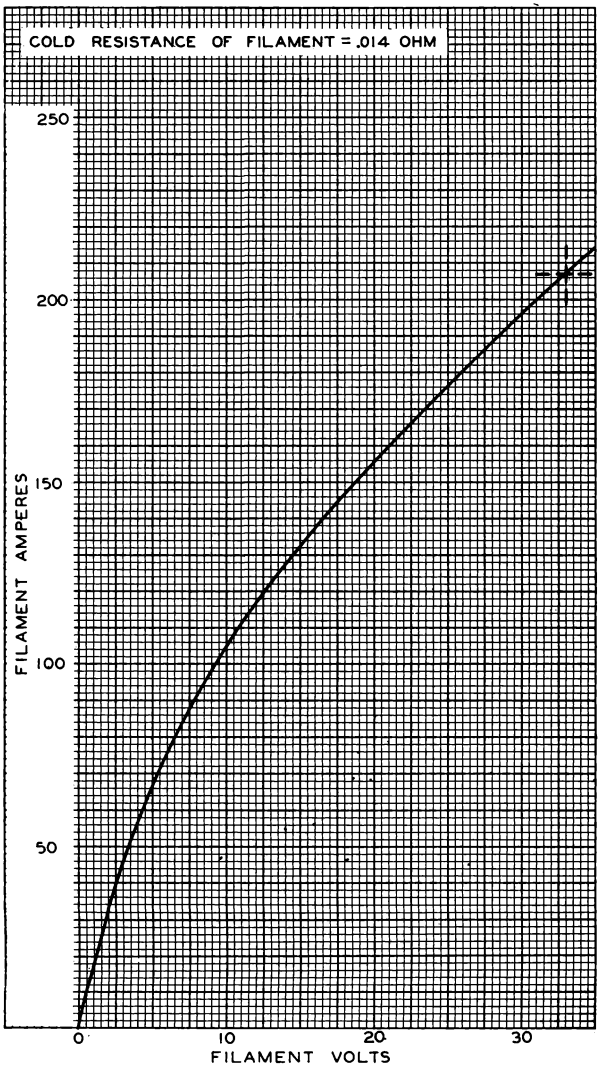
862-A

TRANSMITTING TRIODE



862-A

AVERAGE FILAMENT CHARACTERISTIC



862-A

862-A

TRANSMITTING TRIODE

ADDITIONAL CURVES
FOR THE 862-A ARE THE SAME AS
THOSE FOR TYPE 898-A

865

SCREEN GRID R-F POWER AMPLIFIER

Filament	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	2.0	amp.
Amplification Factor	150 approx.	
Mutual Conductance for plate current of 18 ma.	750	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate	0.10* maximum	μμf
Input	8.5	μμf
Output	8.0	μμf
Maximum Overall Length		5-3/4"
Maximum Diameter		2-1/16"
Bulb		ST-16
Cap		Small Metal
Base		Medium 4-Pin Bayonet

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

R-F POWER AMPLIFIER - Class B (Telephony)

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		750 max.	volts
D-C Screen Voltage		175 max.	volts
D-C Plate Current		30 max.	ma.
R-F Grid Current		4 max.	amp.
Plate Input		22.5 max.	watts
Screen Input		3 max.	watts
Plate Dissipation		15 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5	a-c volts
D-C Plate Voltage	500	750	volts
D-C Screen Voltage	125	125	volts
D-C Grid Voltage	-30	-30	volts
D-C Plate Current	30	22	ma.
D-C Grid Current	5	3	approx. ma.
Driving Power ° **	2	1.5	approx. watts
Power Output	3	4.5	approx. watts

° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	500 max.	volts
D-C Screen Voltage	175 max.	volts
D-C Grid Voltage	-200 max.	volts
D-C Plate Current	60 max.	ma.
D-C Grid Current	15 max.	ma.
R-F Grid Current	4 max.	amp.

* with external shielding.

** See next page.

(continued on next page)

865

SCREEN GRID R-F POWER AMPLIFIER

(continued from preceding page)

Plate Input				30 max.	watts
Screen Input				2 max.	watts
Plate Dissipation				10 max.	watts
Typical Operation:					
Filament Voltage			7.5	7.5	a-c volts
D-C Plate Voltage			375	500	volts
D-C Screen Voltage			125	125	volts
D-C Grid Voltage			-120	-120	volts
D-C Plate Current			50	40	ma.
D-C Grid Current **			11	9	approx.ma.
Driving Power **			3	2.5	approx.watts
Power Output			8.5	10	approx.watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage				750 max.	volts
D-C Screen Voltage				175 max.	volts
D-C Grid Voltage				-200 max.	volts
D-C Plate Current				60 max.	ma.
D-C Grid Current				15 max.	ma.
R-F Grid Current				5 max.	amp.
Plate Input				45 max.	watts
Screen Input				3 max.	watts
Plate Dissipation				15 max.	watts
Typical Operation:					
Filament Voltage	7.5	7.5	7.5	7.5	a-c volts
D-C Plate Voltage	375	500	625	750	volts
D-C Screen Voltage	125	125	125	125	volts
D-C Grid Voltage	-80	-80	-80	-80	volts
D-C Plate Current	55	50	45	40	ma.
D-C Grid Current **	11	9	6	5.5	approx.ma.
Driving Power **	2.5	2.0	1.2	1.0	approx.watts
Power Output	8.5	10	14	16	approx.watts

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

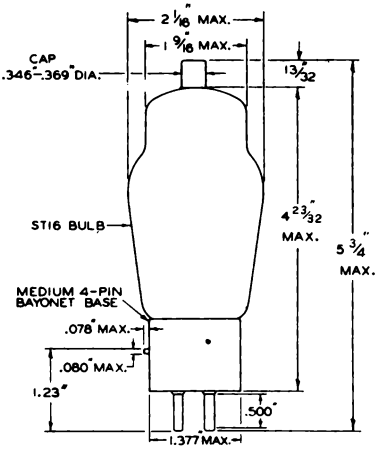
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

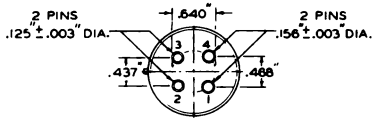
For use of the 865 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs. FREQUENCY.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

865

SCREEN GRID R-F POWER AMPLIFIER

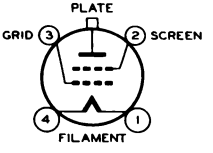




BOTTOM VIEW OF BASE

92S-4272R3

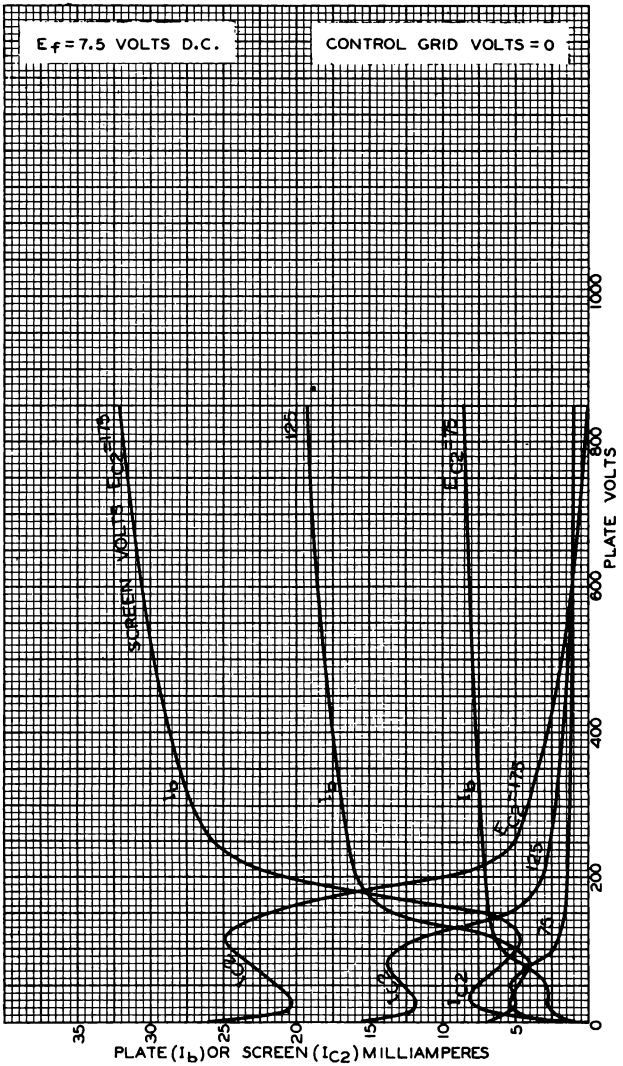
TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



865

865

AVERAGE PLATE CHARACTERISTICS



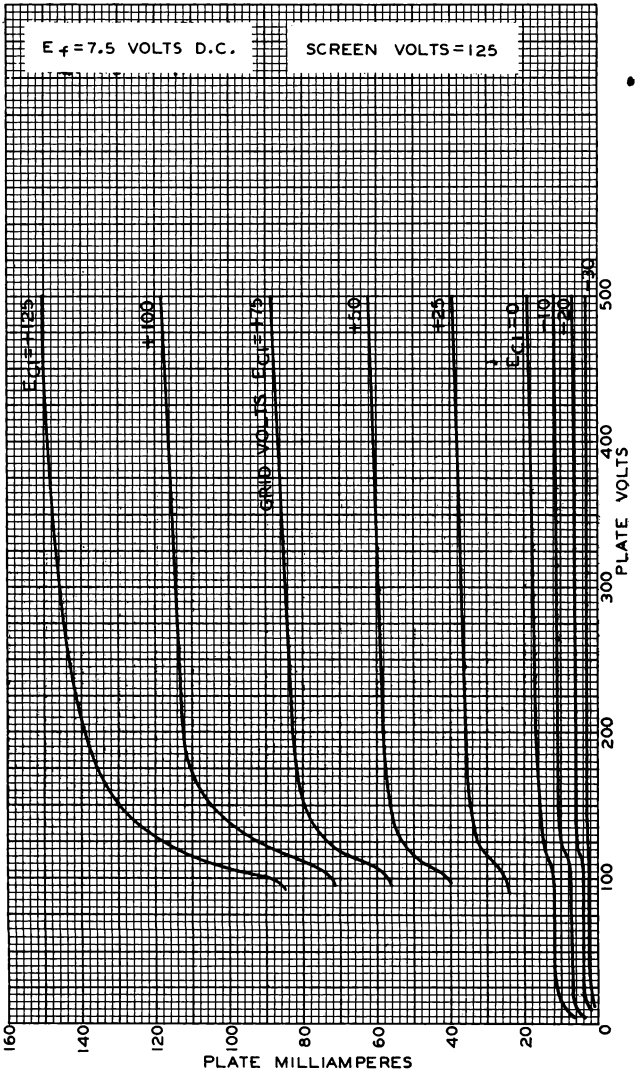
MAY 10, 1935

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

925—5498R1

865

AVERAGE PLATE CHARACTERISTICS



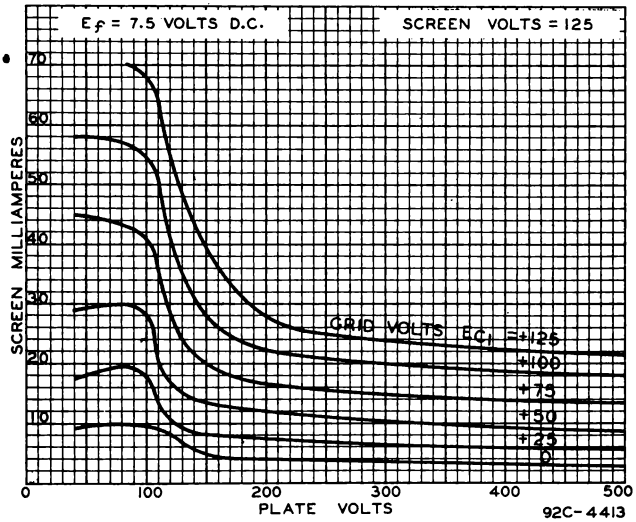
MAY 10,1935

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

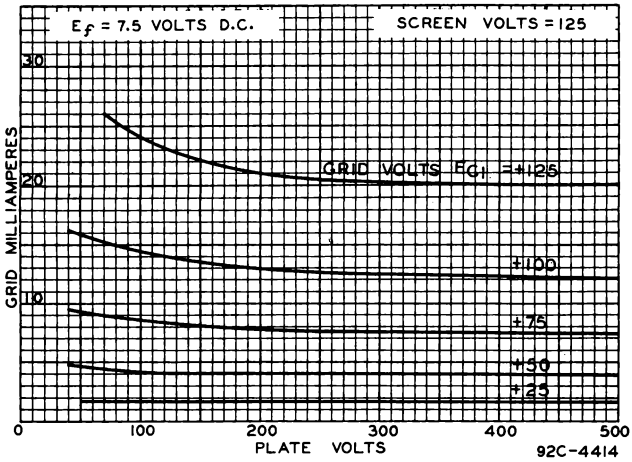
92C-4412

865

AVERAGE CHARACTERISTICS



AVERAGE CHARACTERISTICS



866-A/866

HALF-WAVE MERCURY-VAPOR RECTIFIER

This type supersedes RCA Types 866 and 866-A

Filament *	Coated	
Voltage	2.5	a-c volts
Current	5.0	amp.
Overall Length		6-3/8" ± 3/16"
Seated Height		5-3/4" ± 3/16"
Maximum Diameter		2-7/16"
Bulb		ST-19
Cap		Medium, with Insulating Collar
Base		Medium 4-Pin, Bayonet
RCA Socket		Stock No.9937

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS

	Rating 1	*Rating 2*	*Rating 3*		
Supply Frequency	150	150	1000	max.	~
Condensed-Mercury Temperature Range#	25 - 60	25 - 70	25 - 70		°C
Peak Inverse Plate Voltage	10000	2000	5000	max.	volts
Peak Plate Current	1.0	2.0	1.0	max.	amp.
Average Plate Current	0.25	0.5	0.25	max.	amp.
Tube Voltage Drop	15	15	15	approx.	volts

* The filament of the 866-A/866 is partially shielded from the plate to permit operation from a power supply having a frequency up to 1000 cycles per second. The filament should be allowed to come up to operating temperature before plate voltage is applied. For average conditions, the delay is approximately 30 seconds.

\# Operation at 40° ± 5°C is recommended.

For *shielding* and *r-f filter circuits*, refer to Type 872-A/872.

NOTES ON RATINGS 1 and 3

The table on the next page gives empirical values of choke inductance (L) and the condenser capacitance (C) for choke-input-to-filter circuits which will keep the peak plate current below the recommended maximum, provided the average d-c load current does not exceed the maximum load-current values shown. Values of (L) and (C) are based on a 60-cycle a-c voltage supply.

The capacitance (C) is small enough to prevent excessive surges when power is first applied to the circuit, and yet large enough to give adequate filtering. If the inductance (L) is increased, it is permissible to increase the capacitance in the same proportion. In a two-section filter with two inductances of unequal value, the larger inductance should be placed next to the rectifier tubes. With such an arrangement, the maximum value of each capacitance should be determined on the basis of the value of the inductance preceding it.

The circuits (see Type 872-A/872) of Figs. 1, 2, and 3 will give a ripple voltage less than 5% when used with a two-section filter having the minimum of inductance and the corresponding maximum of capacitance. The circuits of Figs. 4 and 5 will give a ripple voltage of less than 1%. For any of these circuits, better filtering may be obtained with the inductances larger than the minimum given in the table. For these larger inductances, the corresponding capacitances may be increased by the same percentage as the inductances to give still better results.

← Indicates a change.

866-A/866

866-A/866

HALF-WAVE MERCURY-VAPOR RECTIFIER

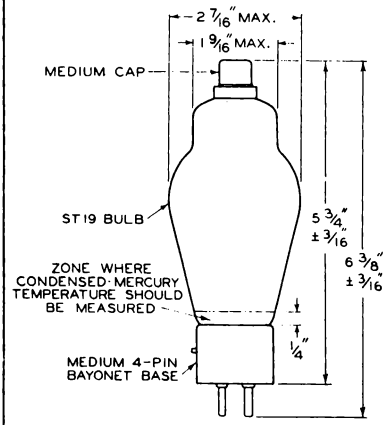
For Circuits, refer to Type 872-A/872.

(continued from preceding page)

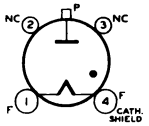
CIRCUIT	A-C INPUT VOLTS** (RMS)	MAX. D-C OUTPUT VOLTS TO FILTER	CHOKE INPUT ONE-SECTION FILTER MIN. CHOKE (L) henrys	CHOKE INPUT ONE-SECTION FILTER MAX. CONDENSER (C) µf	MAX. D-C LOAD CURRENT amperes
SINGLE-PHASE FULL-WAVE (2 tubes) FIG.1	3535 per tube	3180	8.0	1.25	0.5
	3000 " "	2700	6.8	1.5	0.5
	2000 " "	1800	4.5	2.1	0.5
	1500 " "	1350	3.4	2.8	0.5
SINGLE-PHASE FULL-WAVE (4 tubes) FIG.2	7070 total	6360	16.0	0.6	0.5
	6000 "	5400	13.5	0.7	0.5
	5000 "	4500	11.0	0.9	0.5
	4000 "	3600	8.9	1.1	0.5
THREE-PHASE HALF-WAVE FIG.3	4080 per leg	4780	3.2	1.4	0.75
	3000 " "	3510	2.2	2.0	0.75
	2000 " "	2340	1.4	3.0	0.75
	1500 " "	1750	1.1	4.0	0.75
THREE-PHASE DOUBLE-Y PARALLEL FIG.4	4080 per leg	4780	2.0	0.5	1.5
	3000 " "	3510	1.5	0.7	1.5
	2000 " "	2340	1.0	1.1	1.5
	1500 " "	1750	0.7	1.5	1.5
THREE-PHASE FULL-WAVE FIG.5	4080 per leg	9570	1.8	0.5	0.75
	3000 " "	7020	1.4	0.7	0.75
	2000 " "	4680	0.9	1.2	0.75
	1500 " "	3510	0.7	1.5	0.75
SINGLE-PHASE FULL-WAVE (2 tubes) FIG.1 *	3535 per tube	3950	–	–	0.25
	3000 " "	3390	–	–	0.25
	2000 " "	2260	–	–	0.25
	1500 " "	1700	–	–	0.25

* With condenser input to filter.

** For use under the conditions of the 10000-volt peak inverse rating. If the 866-A/866 is to be used under frequency and/or temperature conditions such that the peak inverse voltage is limited to 5000 volts, the a-c input voltage and d-c output voltage values in the table should be multiplied by a factor of 0.5 to give new values for the 5000-volt conditions.



BOTTOM VIEW OF SOCKET CONNECTIONS



●=GAS TUBE TYPE

Pin 1 – Filament
Pin 2 – No Connection
Pin 3 – No Connection
Pin 4 – Filament
Cap – Plate

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

→ Indicates a change.

92CM-6215R1

869-B

HALF-WAVE MERCURY-VAPOR RECTIFIER

GENERAL DATA

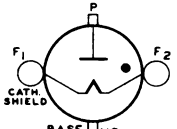
Electrical:

Filamentary Cathode, Coated:

Voltage	5 ± 5%	ac volts
Current	19	amperes
Minimum Heating Time at Rated Voltage	60	seconds
Peak Tube Voltage Drop (Approx.)	15	volts

Mechanical:

Terminal Connections:



F_1 – Filament, Cathode Shield (Anode Return)

F_2 – Filament Cap – Anode

F_1 IS ON LEFT SIDE OF TUBE TYPE MARKING ON BASE

Mounting Position	Vertical with filament end down
Overall Length	14-1/4" ± 3/16"
Maximum Diameter	5-1/8"
Bulb	GT-40
Cap	Skirted Large {JETEC No.C1-9, RCA No.3905}
Base	{JETEC No.A3-20, RCA No.3502}

Temperature Control:

Heating—When the ambient temperature is so low that the normal rise of condensed-mercury temperature above the ambient temperature will not bring the condensed-mercury temperature up to the minimum value of the operating ranges specified under *Maximum Ratings*, some form of heat-conserving enclosure or auxiliary heater will be required.

Cooling—When the operating conditions are such that the maximum value of the operating condensed-mercury temperature range is exceeded, provision should be made for forced-air cooling sufficient to prevent exceeding the maximum value.

Temperature Rise of Condensed Mercury to Equilibrium Above Ambient Temperature (Approx.):*

No Load	15	°C
Full Load	20	°C

HALF-WAVE RECTIFIER—In-Phase Operation●

Maximum Ratings, *Absolute Values: For supply frequency of 60 cps*

	Operating Condensed-Mercury Temperature Range			
	30° to 60°C	30° to 50°C	30° to 40°C	
PEAK INVERSE ANODE VOLTAGE	10000 max.	15000 max.	20000 max.	volts

*,●: See next page.

869-B

869-B

HALF-WAVE MERCURY-VAPOR RECTIFIER

	Operating Condensed-Mercury Temperature Range			
	30° to 60°C	30° to 50°C	30° to 40°C	
ANODE CURRENT:				
Peak	10 max.	10 max.	10 max.	amp
Average** . .	2.5 max.	2.5 max.	2.5 max.	amp
Fault, for duration of 0.1 second max.	100 max.	100 max.	100 max.	amp

HALF-WAVE RECTIFIER—Quadrature Operation●●

Maximum Ratings, *Absolute Values: For supply frequency of 60 cps*

	Operating Condensed-Mercury Temperature Range			
	30° to 60°C	30° to 50°C	30° to 40°C	
PEAK INVERSE ANODE VOLTAGE	10000 max.	15000 max.	20000 max.	volts
ANODE CURRENT:				
Peak	20 max.	20 max.	10 max.	amp
Average** . .	5 max.	5 max.	2.5 max.	amp
Fault, for duration of 0.1 second max.	100 max.	100 max.	100 max.	amp

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	–	21	amp
Critical Anode Voltage . .	2	–	100	volts
Peak Tube Voltage Drop . .	3	–	17	volts

Note 1: With 5 volts rms on filament.

Note 2: With 4.75 volts rms on filament, and condensed-mercury temperature at 30°C.

Note 3: With 5 volts rms on filament, condensed-mercury temperature of 35° ± 5°C, peak anode current of 50 amperes provided by half-cycle pulse from a 60-cps sine wave and recurring approximately once a second. Tube drop is measured by an oscilloscope connected between anode and center tap of filament transformer.

* With filament volts = 4.75 and no heat-conserving enclosure.

● Filament voltage in phase with anode voltage.

●● Filament voltage out of phase (60° to 120°) with anode voltage.

** Averaged over any period of 30 seconds maximum.

OPERATING NOTES

X-Ray Warning. X-rays are produced when the 869-B is operated with a peak inverse anode voltage above 16000 volts (absolute value). These rays can constitute a health hazard unless the tube is adequately shielded for x-ray radiation.

869-B

HALF-WAVE MERCURY-VAPOR RECTIFIER

For Circuit Figures, see Front of this Section

CIRCUIT	MAX. TRANS. SEC. VOLTS (RMS) E	APPROX. DC OUTPUT VOLTS TO FILTER E_{av}	MAX. DC OUTPUT AMPERES I_{av}		MAX. DC OUTPUT KW TO FILTER P_{dc}	
Fig. 1 Half-Wave Single-Phase In-Phase Operation	14000□	6300	2.5		16	
	10600▲	4700	2.5		12	
	7000*	3100	2.5		8	
Fig. 2 Full-Wave Single-Phase In-Phase Operation	7000□	6300	5.0		32	
	5300▲	4700	5.0		24	
	3500*	3100	5.0		16	
Fig. 3 Series Single-Phase In-Phase Operation	14000□	12700	5.0		64	
	10600▲	9500	5.0		48	
	7000*	6300	5.0		32	
Fig. 4 Half-Wave Three-Phase In-Phase Operation	8100□	9500	7.5		72	
	6100▲	7100	7.5		54	
	4000*	4700	7.5		36	
Fig. 5 Parallel Three-Phase Quadrature Operation	8100□	9500	15.0		143	
	6100▲	7100	30.0		215	
	4000*	4700	30.0		143	
Fig. 6 Series Three-Phase Quadrature Operation	8100□	19000	7.5		143	
	6100▲	14200	15.0		215	
	4000*	9500	15.0		143	
Fig. 7 Half-Wave Four-Phase Quadrature Operation			*Resistive Load*	*Inductive Load*	*Resistive Load*	*Inductive Load*
	7000□	9000	9.0	10.0	81	90
	5300▲	6700	18.0	20.0	121	135
	3500*	4500	18.0	20.0	81	90
Fig. 8 Half-Wave Six-Phase Quadrature Operation			*Resistive Load*	*Inductive Load*	*Resistive Load*	*Inductive Load*
	7000□	9500	9.5	10.0	91	96
	5300▲	7100	19.0	20.0	136	143
	3500*	4700	19.0	20.0	91	96

□ For maximum peak inverse anode voltage of 20000 volts, and condensed-mercury-temperature range of 30° to 40°C.

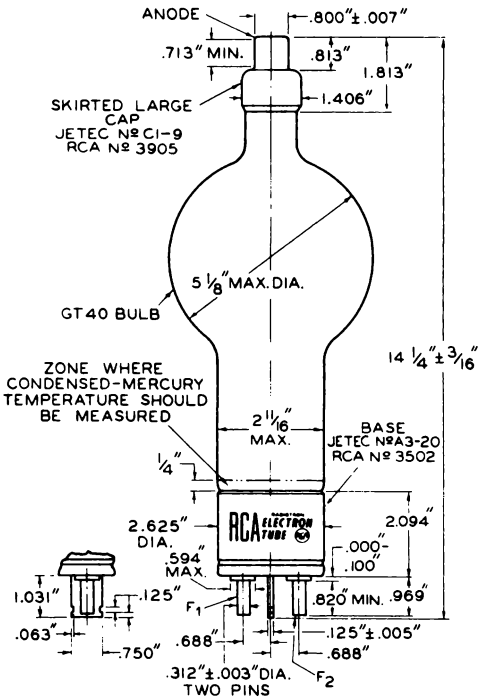
▲ For maximum peak inverse anode voltage of 15000 volts, and condensed-mercury-temperature range of 30° to 50°C.

* For maximum peak inverse anode voltage of 10000 volts, and condensed-mercury-temperature range of 30° to 60°C.

869-B

869-B

HALF-WAVE MERCURY-VAPOR RECTIFIER



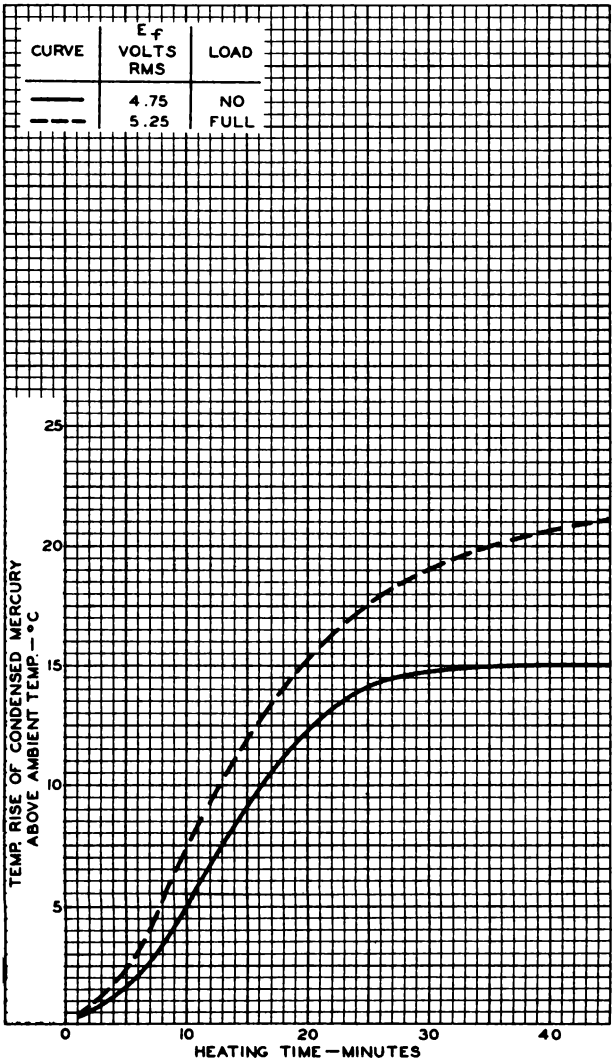
F_1 = FILAMENT AND CATHODE SHIELD (ANODE RETURN)

F_2 = FILAMENT

92CM-4330R4

869-B

RATE OF RISE OF COND.-MERCURY TEMPERATURE



870-A

HALF-WAVE MERCURY-VAPOR RECTIFIER

The 870-A supersedes the Type 870

Heater	Coated Unipotential Cathode*	
Voltage	5	a-c volts
Current	65	amp.
Starting - The heater current must never exceed 2 times the normal value, even momentarily.		
Maximum Overall Length (Including Flexible Leads)		46-3/4"
Maximum Diameter		5-9/16"
Bulb (See *Outline Drawing*)		Metal Shell
Terminal Connections▲		See *Outline Drawing*

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS

Peak Inverse Plate Voltage:	
For Supply Frequency up to 150 ∿:	
Cond.-Mercury Temp. 35° to 40°C●	16000 max. volts
Cond.-Mercury Temp. 35° to 50°C●	7500 max. volts
Peak Plate Current	
For Supply Frequency above 25 ∿	450 max. amp.
Average Plate Current {Averaged over period of 60 sec.max.}	75 max. amp.
Surge Current for max. of 0.2 sec.	4500 max. amp.
Peak Tube Voltage Drop	10 volts
Cooling	Forced Air

* The cathode should be allowed to come up to operating temperature and the mercury vapor to reach operating pressure before plate voltage is applied. For average conditions, the delay is about 30 minutes.

▲ Metal shell is connected within the tube to the cathode lead.

● With forced-air ventilation. Recommended temperature of condensed mercury 35°C $^{+5°}_{-0°}$.

For *rectifier circuits*, and *r-f filter circuits*, refer to Type 872-A/872.

The table below classifies suitable rectifier circuits for the 870-A and shows their safe maximum input and maximum output operating conditions for a peak inverse voltage of 16000 volts. The values are based on sine-wave input and the use of a suitable choke preceding any condenser in the filter circuit. If the 870-A is to be used under temperature conditions such that the peak inverse voltage is limited to 7500 volts, the a-c input voltage and d-c output voltage values in the table should be multiplied by a factor of 0.47 to give the maximum values for the 7500-volt conditions.

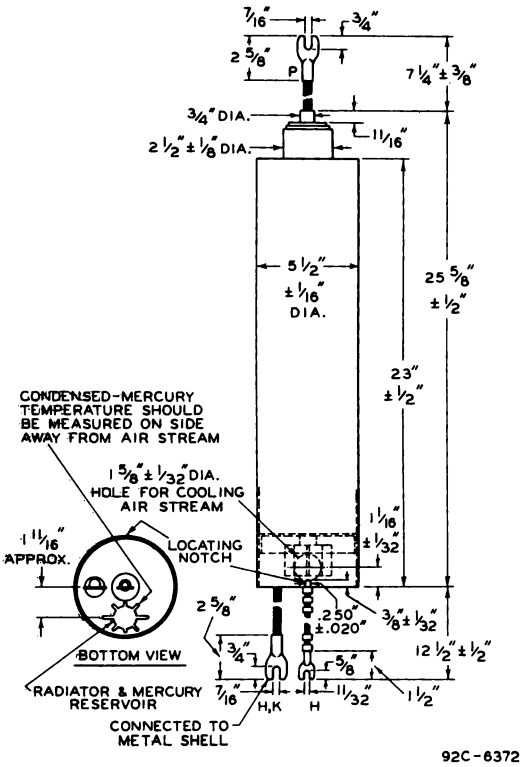
CIRCUIT	MAXIMUM A-C INPUT VOLTS■ (RMS)	APPROX. D-C OUTPUT VOLTS TO FILTER	MAX. D-C OUTPUT CURRENT amperes
SINGLE-PHASE FULL-WAVE (2 tubes) Fig. 1	5650 per tube	5100	150
SINGLE-PHASE FULL-WAVE (4 tubes) Fig. 2	11300 total	10200	150
THREE-PHASE HALF-WAVE Fig. 3	6540 per leg	7650	225
THREE-PHASE DOUBLE-Y PARALLEL Fig. 4	6540 per leg	7650	450
THREE-PHASE FULL-WAVE Fig. 5	6540 per leg	15300	225

■ For maximum peak inverse voltage of 16000 volts.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

870-A

HALF-WAVE MERCURY-VAPOR RECTIFIER



TUBE SYMBOL AND TERMINAL CONNECTIONS

NOTE: Special end-mountings are required.

P – Plate
H – Heater
K – Cathode
● – Gas Tube Type

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

872-A/872

HALF-WAVE MERCURY-VAPOR RECTIFIER

This Type Supersedes RCA Types 872 and 872-A

Filament*	Coated	
Voltage	5.0	a-c volts
Current	7.5	amp.
Maximum Overall Length		8-1/2"
Maximum Diameter		2-5/16"
Bulb		T-18
Cap	Medium Metal, with Insulating Collar	
Base °		Jumbo 4-Large Pin
RCA Socket (Type UT-541-A)		Stock No.9936

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS

Peak Inverse Voltage	
For Supply Frequency up to 150 ~	
Cond.-Mercury Temp. 20° to 60°C #	10000 max. volts
Cond.-Mercury Temp. 20° to 70°C #	5000 max. volts
Peak Plate Current	5 max. amp.
Average Plate Current	1.25 max. amp.
Tube Voltage Drop (Approx.)	10 volts

° Base shell is not connected within the base to either filament lead.
Operation at 40° ± 5°C is recommended.
* The filament of the 872-A/872 should be allowed to come up to operating temperature before plate voltage is applied. For average conditions the delay is approximately 30 seconds.

If the plate return of each tube is not connected to the center-tap of the filament-supply winding, the return should be made to that side of the filament to which the cathode shield is connected.

Shielding and *r-f filter circuits* should be isolated from the transmitter as much as possible in order to avoid the detrimental effects of magnetic and electrostatic fields. These fields tend to produce breakdown in the mercury vapor, are detrimental to tube life and make filtering difficult. External shielding should be used when the tubes are in proximity to these external fields. R-f filtering should be used when the tubes are affected by r-f voltages. When shields are used, special attention must be given to adequate ventilation and to the maintenance of normal condensed-mercury temperature.

The table below classifies suitable rectifier circuits for the 872-A/872 and shows their safe maximum input and maximum output operating conditions for a peak inverse voltage of 10000 volts. The values are based on sine-wave input and the use of a suitable choke preceding any condenser in the filter circuit. If the 872-A/872 is to be used under temperature conditions such that the peak inverse voltage is limited to 5000 volts, the a-c input voltage and d-c output voltage values in the table should be multiplied by a factor of 0.5 to give the maximum values for the 5000-volt conditions.

CIRCUIT	MAXIMUM A-C INPUT VOLTS□ (RMS)	APPROX. D-C OUTPUT VOLTS TO FILTER	MAX. D-C OUTPUT CURRENT amperes
SINGLE-PHASE FULL-WAVE (2 tubes) Fig. 1	3535 per tube	3180	2.5
SINGLE-PHASE FULL-WAVE (4 tubes) Fig. 2	7070 total	6360	2.5
THREE-PHASE HALF-WAVE Fig. 3	4080 per leg	4780	3.75
THREE-PHASE DOUBLE-Y PARALLEL Fig. 5	4080 per leg	4780	7.5
THREE-PHASE FULL-WAVE Fig. 5	4080 per leg	9570	3.75

□ For maximum peak inverse voltage of 10000 volts.

CIRCUITS FOR HOT-CATHODE MERCURY-VAPOR RECTIFIER TUBES

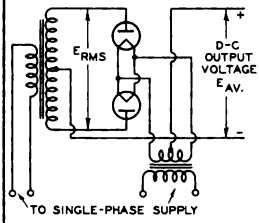


FIG. 1

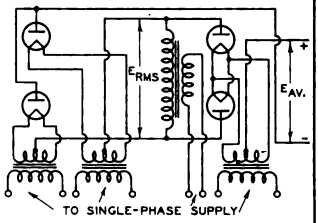


FIG. 2

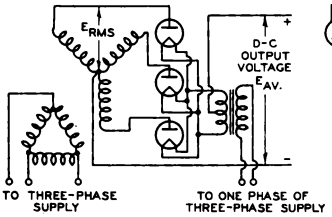


FIG. 3

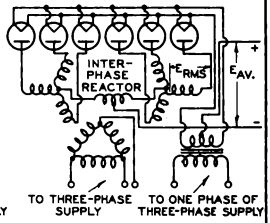


FIG. 4

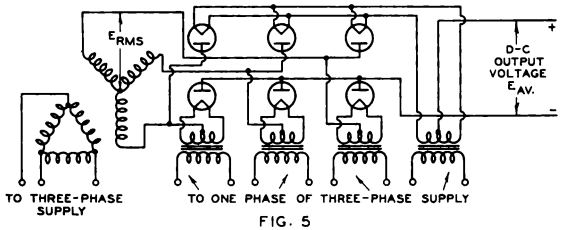


FIG. 5

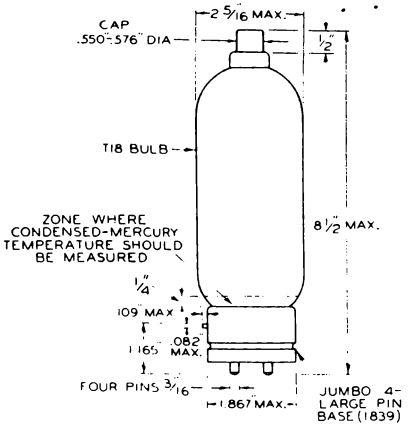
FIGURE	CIRCUIT	$E_{AVERAGE}$	$E_{INVERSE}$	$I_{AVERAGE}$
1	SINGLE-PHASE FULL-WAVE (2 TUBES)	$0.318\,E_{MAXIMUM}$ $0.450\,E_{RMS}$	$3.14\,E_{AVERAGE}$	$0.636\,I_{MAXIMUM}$
2	SINGLE-PHASE FULL-WAVE (4 TUBES)	$0.636\,E_{MAXIMUM}$ $0.900\,E_{RMS}$	$1.57\,E_{AVERAGE}$	$0.636\,I_{MAXIMUM}$
3	THREE-PHASE HALF-WAVE	$0.827\,E_{MAXIMUM}$ $1.170\,E_{RMS}$	$2.09\,E_{AVERAGE}$	$0.827\,I_{MAXIMUM}$
4	THREE-PHASE DOUBLE-Y PARALLEL	$0.827\,E_{MAXIMUM}$ $1.170\,E_{RMS}$	$2.09\,E_{AVERAGE}$	$1.91\,I_{MAXIMUM}$
5	THREE-PHASE FULL-WAVE	$1.65\,E_{MAXIMUM}$ $2.34\,E_{RMS}$	$1.045\,E_{AVERAGE}$	$0.955\,I_{MAXIMUM}$

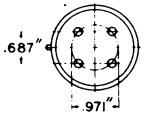
CONDITIONS ASSUMED :-

(1) SINE-WAVE SUPPLY (2) BALANCED PHASE VOLTAGES (3) ZERO TUBE DROP (4) PURE RESISTANCE LOAD (5) NO FILTER USED

872-A/872

HALF-WAVE MERCURY-VAPOR RECTIFIER





BOTTOM VIEW OF BASE

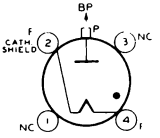
92C-6396

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

BOTTOM VIEW OF
SOCKET CONNECTIONS

Pin 1 - No Connection
Pin 2 - Filament, Cathode Shield
Pin 3 - No Connection
Pin 4 - Filament
Cap - Plate
● - Gas Type Tube



880

POWER TRIODE

WATER & FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament, Tungsten:

Voltage	12.6	ac or dc volts
Current	320	amp
Starting Current: The filament current should never exceed 480 amperes, even momentarily.		
Cold Resistance	0.003	ohm ←

This tube can often be operated with reduced filament voltage, as explained on sheet TYPES OF CATHODES in General Section.

Amplification Factor	20	
Direct Interelectrode Capacitances:		←
Grid to Plate	24	μμf
Grid to Filament	35	μμf
Plate to Filament	2	μμf

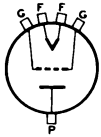
Mechanical:

Terminal Connections:

F – Filament

G – Grid

P – Water-Cooled Plate



Grid terminals are spaced diametrically wider than filament terminals.

Mounting Position	Vertical, Glass End Up	
Maximum Overall Length	11-1/2"	
Maximum Diameter	7"	
Water Flow	12 to 20	gpm

The specified water flow must start before application of any voltages, and may be removed simultaneously with the filament and plate power.

Air Flow	20 min.	cfm

The specified air flow should be directed vertically from a 3"-diameter nozzle onto the top portion of the bulb before and during the application of any voltages.

Water Pressure in Jacket	80 max.	psi
Outlet Water Temperature	70 max.	°C
Bulb Temperature	180 max.	°C
Seal Temperature (Filament, grid, plate)	165 max.	°C

Components:

Water Jacket	RCA MI-19461 ←
Jacket Wrench	RCA MI-19436
Gasket	RCA MI-7441
Terminal-Post Chuck Connector (4 required)	RCA MI-19466
Chuck Wrench (2 required)	RCA MI-19424

AF POWER AMPLIFIER & MODULATOR-Class B

Maximum CCS• Ratings, *Absolute Values*:

DC PLATE VOLTAGE	10500 max.	volts

•,*: See next page. ← Indicates a change.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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POWER TRIODE

MAX.-SIGNAL DC PLATE CURRENT*	5 max.	amp
MAX.-SIGNAL PLATE INPUT*	40 max.	kw
PLATE DISSIPATION*	15 max.	kw

→ **TYPICAL OPERATION:**

Values are for 2 tubes

DC Plate Voltage	7500	10000	volts
DC Grid Voltage	-340	-450	volts
Peak AF Grid-to-Grid Voltage	1450	1680	volts
Zero-Signal DC Plate Current	1	1	amp
Max.-Signal DC Plate Current	6.7	7	amp
Effective Load Resistance (Plate-to-plate)	2300	3100	ohms
Max.-Signal Driving Power (Approx.)#	490	540	watts
Max.-Signal Power Output (Approx.)	31.5	46	kw

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	10500 max.	volts
DC PLATE CURRENT	4 max.	amp
PLATE INPUT	32 max.	kw
PLATE DISSIPATION	20 max.	kw

→ **Typical Operation:**

DC Plate Voltage	7500	10000	volts
DC Grid Voltage	-340	-460	volts
Peak RF Grid Voltage	570	595	volts
DC Plate Current	3.3	2.75	amp
DC Grid Current (Approx.)□	0.013	0.009	amp
Driving Power (Approx.)■□	1250	900	watts
Power Output (Approx.)	8	9	kw

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	10500 max.	volts
DC GRID VOLTAGE	-1200 max.	volts
DC PLATE CURRENT	3.6 max.	amp
→ DC GRID CURRENT	0.8 max.	amp
PLATE INPUT	36 max.	kw
PLATE DISSIPATION	12 max.	kw

* Averaged over any audio-frequency cycle of sine-wave form.

\# The driving stage should have good regulation and should be capable of supplying considerably more than the specified driving power.

■ At crest of audio-frequency cycle with modulation factor of 1.0.

●, □: See next page. → Indicates a change.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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POWER TRIODE

Typical Operation:

DC Plate Voltage	7500	10000	volts
DC Grid Voltage●	−1000	−1200	volts
Peak RF Grid Voltage	1560	1840	volts
DC Plate Current	3	3.6	amp
DC Grid Current (Approx.)□	0.57	0.64	amp
Driving Power (Approx.)□	850	1100	watts
Power Output (Approx.)	16	27	kw

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum CCS● Ratings, *Absolute Values*:

	1.5 to 25 Mc		*Below 1.5 Mc*	
DC PLATE VOLTAGE	10500 max.		15000 max.	volts
DC GRID VOLTAGE	−1200 max.		−1600 max.	volts
DC PLATE CURRENT	6 max.		4.5 max.	amp
DC GRID CURRENT	0.8 max.		1 max.	amp
PLATE INPUT	60 max.		67.5 max.	kw
PLATE DISSIPATION	20 max.		20 max.	kw

Typical Operation:

DC Plate Voltage	7500	10000	10000	volts
DC Grid Voltage▲	−600	−800	−1000	volts
Peak RF Grid Voltage	1250	1460	1830	volts
DC Plate Current	4.8	4.5	6	amp
DC Grid Current (Approx.)□	0.79	0.78	0.8	amp
Driving Power (Approx.)□	920	1000	1500	watts
Power Output (Approx.)	24	33	40	kw

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	300	330	amp
Amplification Factor	1,2	17	23	
Grid-Plate Capacitance	–	21	27	μμf
Grid-Filament Capacitance	–	28.8	41.2	μμf
Plate-Filament Capacitance	–	1	3	μμf
Plate Voltage	1,3	6500	8100	volts
Plate Voltage	1,4	2800	3600	volts

● Continuous Commercial Service.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

□ For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—*Grid Current and Driving Power* in the General Section.

⊕ Obtained by grid resistor, or by partial self-bias methods.

▲ Obtained from cathode resistor, grid resistor, or by partial self-bias methods.

← Indicates a change.

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RCA

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POWER TRIODE

	Note	Min.	Max.	
Grid Voltage	1,5	-460	-690	volts
Grid Voltage	1,6	-	1300	volts
Grid Current	1,6	-	10	amp
Peak Cathode Current	1,7	35	-	amp
Power Output	1,8	28	-	kw

Note 1: With 12.6 volts ac on filament.

Note 2: With dc grid voltage of -100 volts, and plate voltage adjusted to give dc plate current of 2 amp.

Note 3: With dc grid voltage of -200 volts, and plate voltage adjusted to give dc plate current of 2 amp.

Note 4: With dc grid voltage of 0 volts, and plate voltage adjusted to give dc plate current of 2 amp.

Note 5: With dc plate voltage of 10000 volts, and dc grid voltage adjusted to give dc plate current of 20 ma.

Note 6: With dc plate voltage of 2000 volts, and instantaneous grid voltage adjusted to give instantaneous plate current of 25 amp.

Note 7: Represents the maximum usable cathode current (plate current and grid current) for the tube under any condition of operation.

Note 8: With dc plate voltage of 10000 volts, dc plate current of 4.5 amp., dc grid current of 0.8 amp., dc grid voltage of -1000 volts, and frequency of 25 Mc.

Data on operating frequencies for the 880 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

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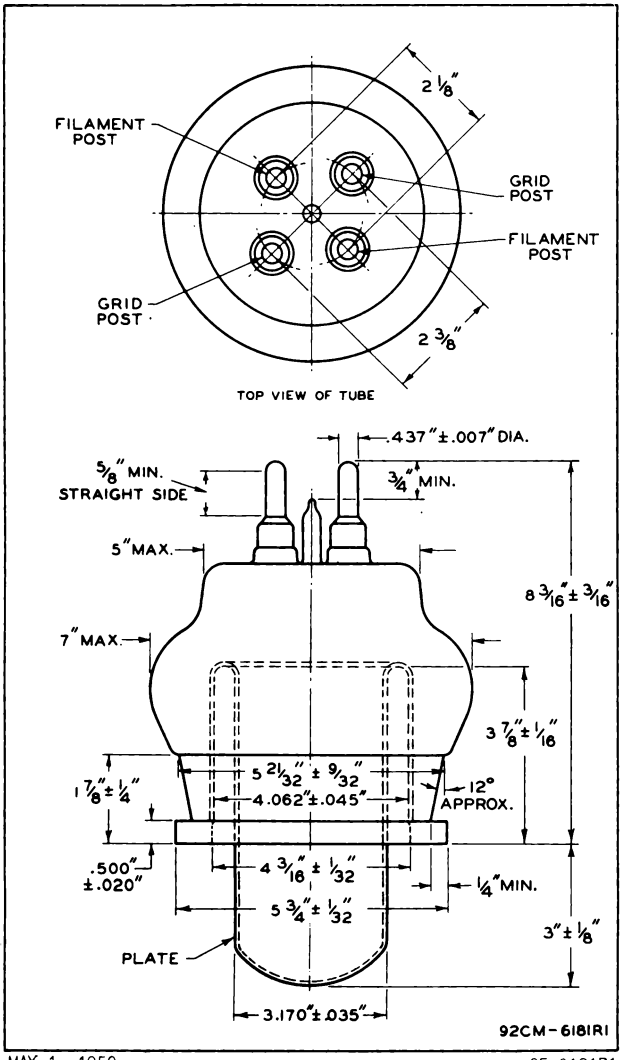
POWER TRIODE



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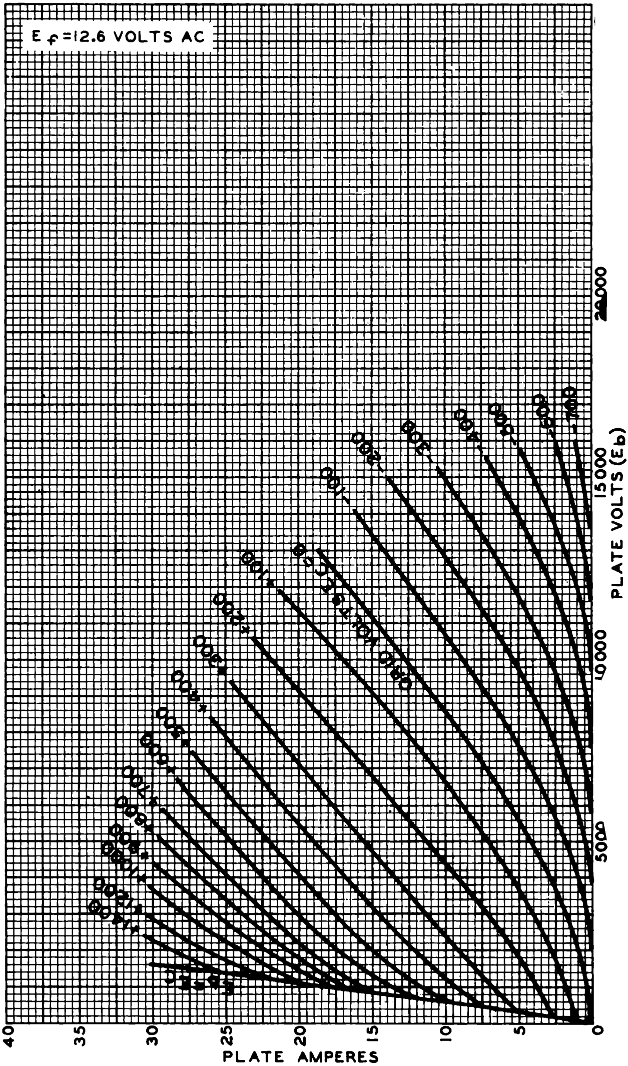
AVERAGE PLATE CHARACTERISTICS



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92CM-6927

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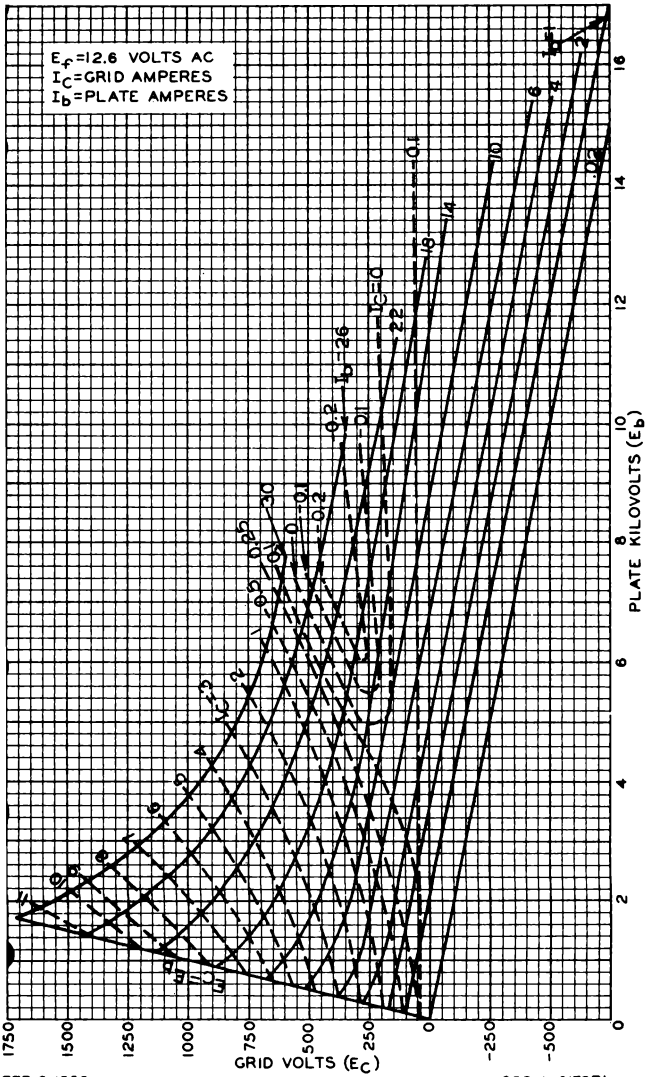
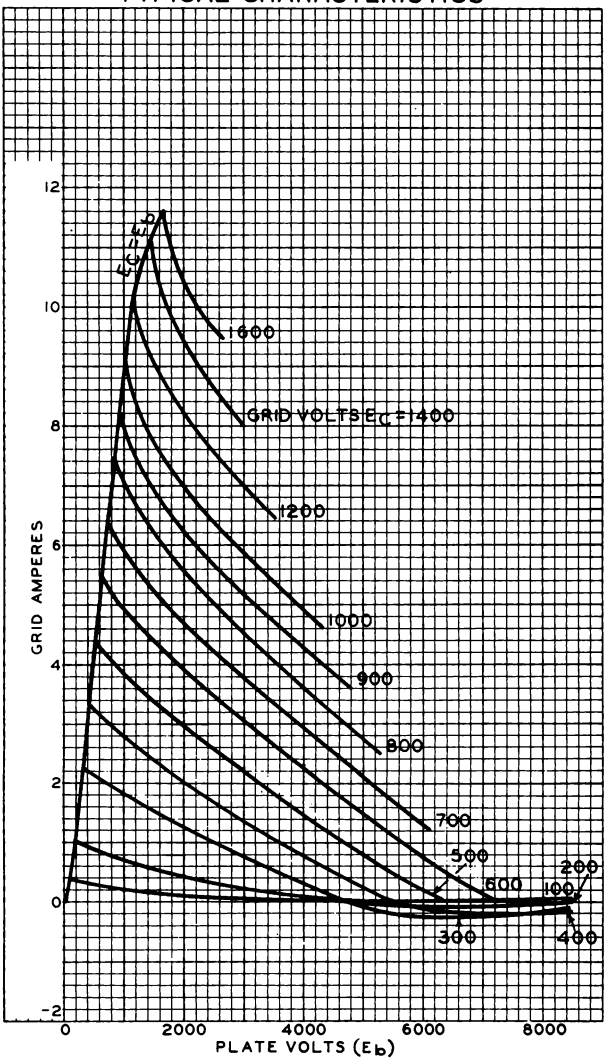
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



FEB.8,1950 TUBE DEPARTMENT 92CM-6178R1

880

TYPICAL CHARACTERISTICS



889-A

TRANSMITTING TRIODE

WATER & FORCED-AIR COOLED

Supersedes Type 88g

GENERAL DATA

Electrical:

Filament, Tungsten:

Voltage	11	volts
Current	125	amp

Starting Current: The filament current must never exceed 187 amperes, even momentarily.

Amplification Factor	21	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	17.5	μμf
Grid to Filament	23.3	μμf
Plate to Filament	2.7	μμf

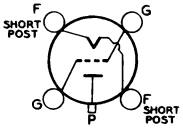
Mechanical:

Terminal Connections:

F – Filament (Short Terminals)

G – Grid (Long Terminals)

TOP VIEW



P – Water-Cooled Plate Terminal

Mounting Position	Vertical only, glass end up
Overall Length	10-7/16" ± 1/4"
Maximum Diameter	3-5/8"
Water Jacket	Type UT-4000

Water Flow: 3 to 6 gallons per minute must start before application of any voltages, and must continue for at least 5 minutes after removal of all voltages. Water temperature at jacket outlet must not exceed 70°C under any conditions of operation.

Air Flow: 15 cu.ft. per minute through a 3-inch diameter nozzle must be directed downward toward grid and plate seals before and during the application of any voltages to limit temperature of glass at hottest point to 150°C.

This tube can often be operated at reduced filament voltage, as explained on sheet TYPES OF CATHODES in General Section.

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	8500 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	2 max.	amp
MAX.-SIGNAL PLATE INPUT*	12 max.	kw
PLATE DISSIPATION*	5 max.	kw

Typical Operation:

Unless otherwise specified, values are for two tubes

DC Plate Voltage	5000	6000	7500	volts
DC Grid Voltage●	-180	-230	-300	volts
Peak AF Grid-to-Grid Volt.	1460	1680	1700	volts

* Averaged over any audio-frequency cycle of sine-wave form.

●: See next page.

889-A
TRANSMITTING TRIODE

Zero-Signal DC Plate Cur.	0.4	0.4	0.4	. .	amp
Max.-Signal DC Plate Cur. . .	3.2	3.6	3.2	. .	amp
Effective Load Resistance (plate-to-plate).	2520	3680	5000	. .	ohms
Max.-Signal Driving Power (Approx.)	170	180	150	. .	watts
Max.-Signal Power Output (Approx.)	8.8	12	15	. .	kw

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE.	8500 max.	volts
DC PLATE CURRENT.	1.0 max.	amp
PLATE INPUT	7.5 max.	kw
PLATE DISSIPATION	5.0 max.	kw

Typical Operation:

DC Plate Voltage.	6000	7500	. .	volts
DC Grid Voltage●.	-250	-300	. .	volts
Peak RF Grid Voltage.	920	1000	. .	volts
DC Plate Current.	0.9	0.9	. .	amp
Driving Power (Approx.)**#.	95	80	. .	watts
Power Output (Approx.).	1.5	2	. .	kw

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE.	6000 max.	volts
DC GRID VOLTAGE	-1000 max.	volts
DC PLATE CURRENT.	1.0 max.	amp
DC GRID CURRENT	0.25 max.	amp
PLATE INPUT	6.0 max.	kw
PLATE DISSIPATION	3.0 max.	kw

Typical Operation:

DC Plate Voltage.	5000	6000	. .	volts
DC Grid Voltage	-800	-900	. .	volts
Peak RF Grid Voltage.	1300	1420	. .	volts
DC Plate Current.	0.9	1.0	. .	amp
DC Grid Current (Approx.)#.	0.12	0.1	. .	amp
Driving Power (Approx.)#.	155	140	. .	watts
Power Output (Approx.).	2.75	4	. .	kw

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation##

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE.	8500 max.	volts
DC GRID VOLTAGE	-1000 max.	volts

●, **, #, ##: See next page.

889-A

TRANSMITTING TRIODE

DC PLATE CURRENT	2.0 max.		amp
DC GRID CURRENT	0.25 max.		amp
PLATE INPUT	16 max.		kw
PLATE DISSIPATION	5 max.		kw

Typical Operation:

DC Plate Voltage	5000	6000	7500	volts
DC Grid Voltage	-500	-600	-800	volts
Peak RF Grid Voltage	1200	1460	1830	volts
DC Plate Current	1.5	1.8	2.0	amp
DC Grid Current (Approx.)#	0.19	0.21	0.24	amp
Driving Power (Approx.)#	220	290	400	watts
Power Output (Approx.)	5	7	10	kw

● With ac filament excitation.

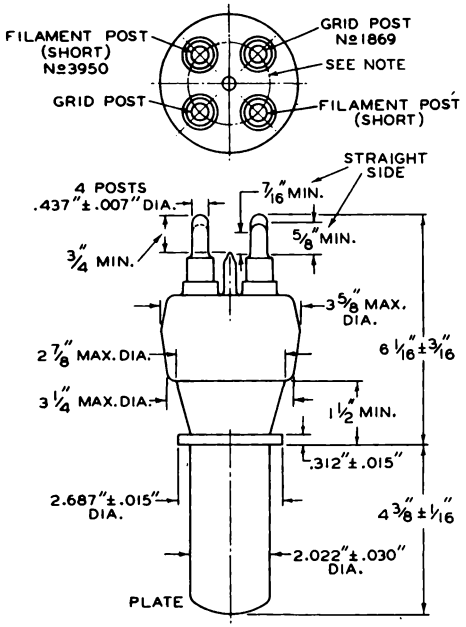
** At crest of audio-frequency cycle with modulation factor of 1.0.

Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

Data on operating frequencies for the 889-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

889-A
TRANSMITTING TRIODE



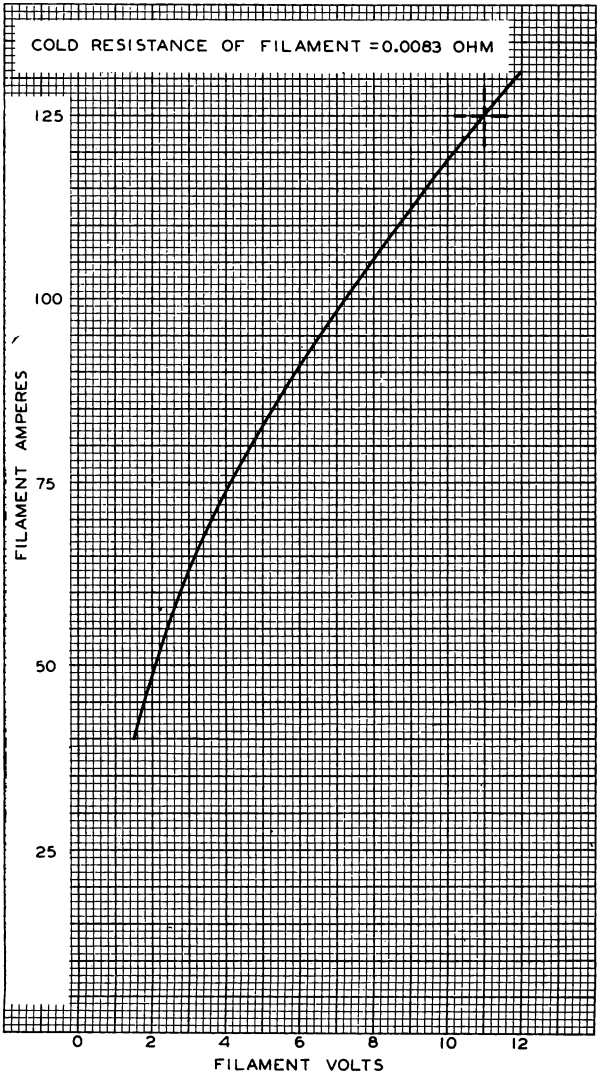
NOTE: THE TUBE BASE SHALL BE CAPABLE OF ENTERING TO A DISTANCE OF 5/8" IN A FLAT-PLATE GAUGE HAVING FOUR HOLES .536" ± .001" DIAMETER ARRANGED ON A CIRCLE OF 2.125" ± .001" DIAMETER AT ANGLES OF 90° ± 10'.

92CM-6039R2

889-A

889-A

AVERAGE FILAMENT CHARACTERISTIC



MAY 22, 1939

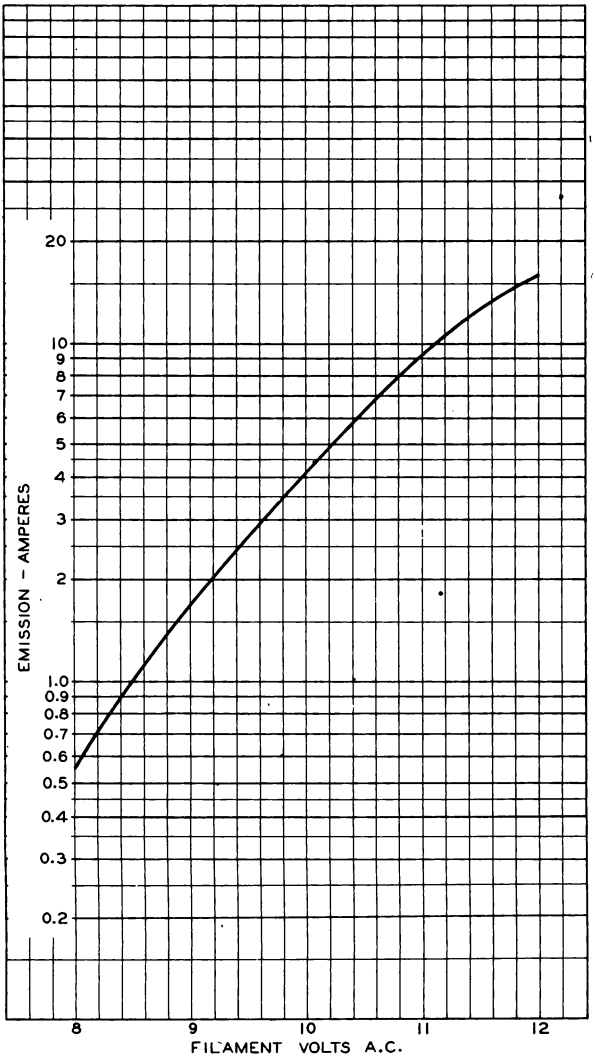
TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92C-6086

889-A

889-A

AVERAGE FILAMENT-EMISSION CHARACTERISTIC



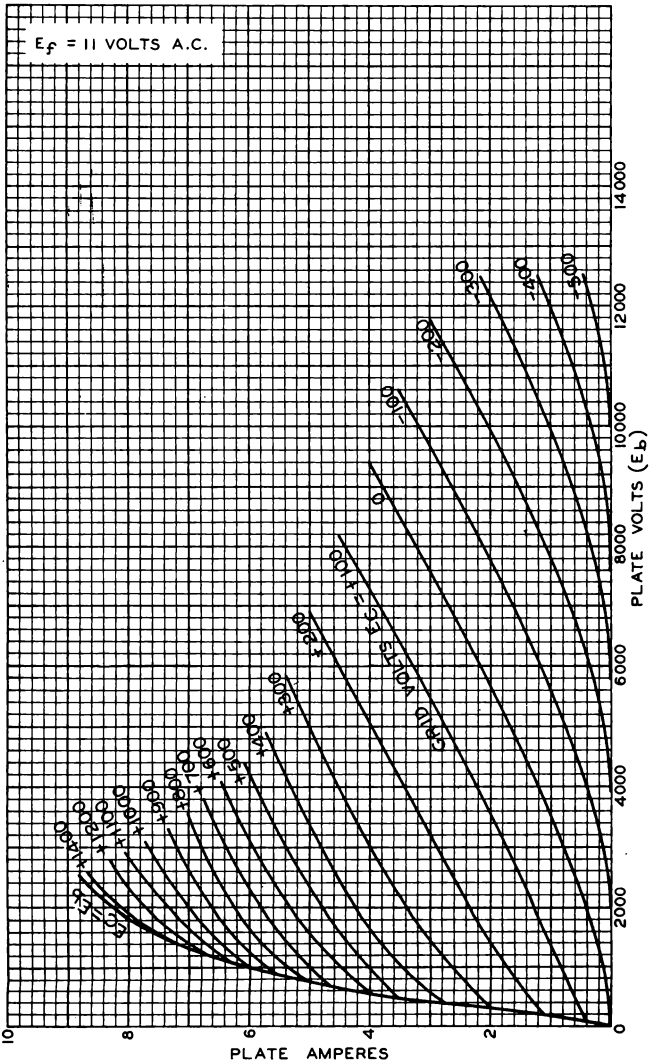
JUNE 10, 1940

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92C-6174

889-A

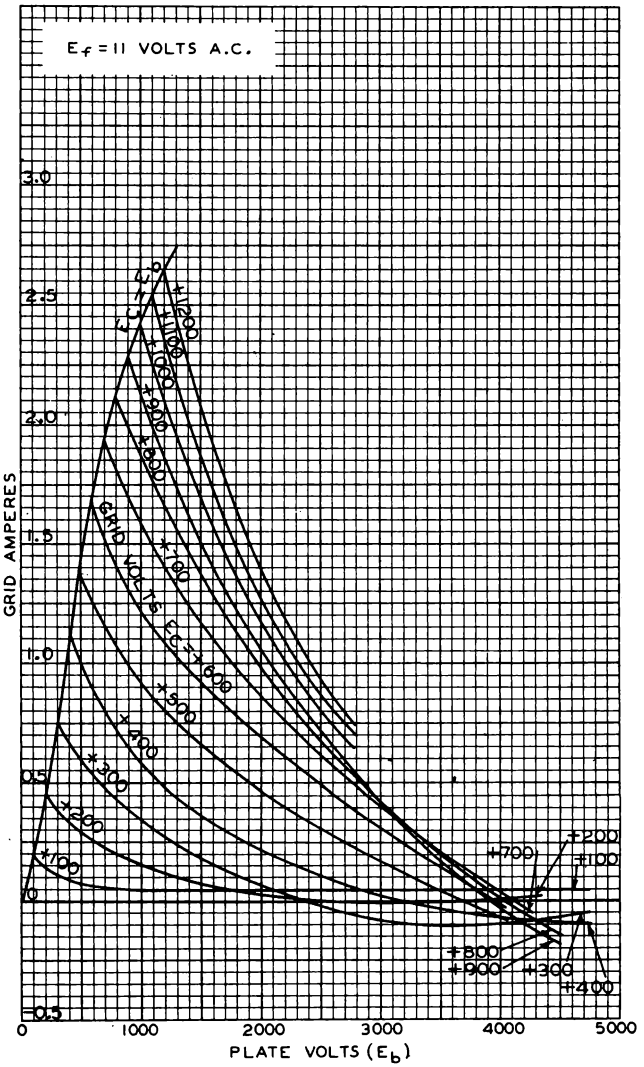
AVERAGE PLATE CHARACTERISTICS



889-A

889-A

TYPICAL CHARACTERISTICS



JUNE 15, 1939

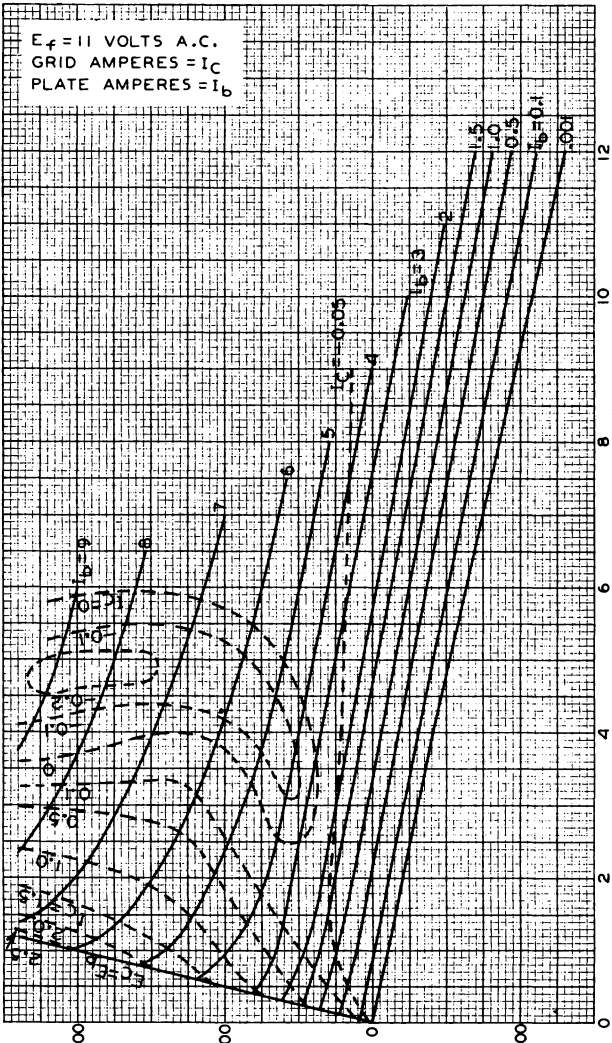
TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92C-6064

889-A

889-A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



MAY 22, 1939

TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92C-6088

889R-A

TRANSMITTING TRIODE

FORCED-AIR COOLED

Supersedes Type 889-R

GENERAL DATA

Electrical:

Filament, Tungsten:

Voltage	11	volts
Current	125	amp

Starting Current: The filament current must never exceed 187 amperes, even momentarily.

Amplification Factor . . . 21

Direct Interelectrode Capacitances (Approx.):

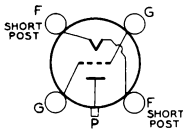
Grid to Plate	18.5	μμf
Grid to Filament	23.3	μμf
Plate to Filament	3.0	μμf

Mechanical:

Terminal Connections:

F - Filament (Short Terminals)
G - Grid (Long Terminals)

TOP VIEW



P - Water-Cooled Plate Terminal

Mounting Position	Vertical only, glass end up
Overall Length	11-1/2" ± 3/8"
Radiator Clamp Diameter	10-7/8" ± 1/8"
Radiator	Integral part of tube

Air Flow:

	For Plate Dissipation of 3.3 KW	4.0 KW	5.0 KW	
Through Radiator	325 min.	390 min.	500 min.	cfm
At Pressure of	0.38 min.	0.5 min.	0.7 min.	in. of water

The specified air flow should be delivered by a blower vertically upward through the radiator before and during the application of any voltages.

To Grid and Filament Seals . . . . . 15 . . . cfm

The specified air flow must be directed vertically downward from a 3-inch diameter nozzle upon the grid and filament seals before and during the application of any voltages in order to limit the temperature of the glass at the hottest part to the maximum specified value.

Bulb Temperature	150 max.	°C
Input Air Temperature (to Radiator)	50 max.	°C
Radiator Temperature	180 max.	°C

This tube can often be operated with reduced filament voltage, as explained on sheet TYPES OF CATHODES in General Section.

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum Ratings, *Absolute Values:*

DC PLATE VOLTAGE	8500 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	2.0 max.	amp
MAX.-SIGNAL PLATE INPUT*	12 max.	kw
PLATE DISSIPATION*	5.0 max.	kw

* Averaged over any audio-frequency cycle of sine-wave form.

889R-A
TRANSMITTING TRIODE

Typical Operation:

Unless otherwise specified, values are for two tubes

DC Plate Voltage	5000	6000	7500	volts
DC Grid Voltage●	-180	-230	-300	volts
Peak AF Grid-to-Grid Volt.	1460	1680	1700	volts
Zero-Signal DC Plate Cur.	0.4	0.4	0.4	amp
Max.-Signal DC Plate Cur.	3.2	3.6	3.2	amp
Effective Load Resistance (plate-to-plate)	2520	3680	5000	ohms
Max.-Signal Driving Power (Approx.)	170	180	150	watts
Max.-Signal Power Output (Approx.)	8.8	12	15	kw

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

DC PLATE VOLTAGE	8500 max.	volts
DC PLATE CURRENT	1.0 max.	amp
PLATE INPUT	7.5 max.	watts
PLATE DISSIPATION	5.0 max.	watts

Typical Operation:

DC Plate Voltage	6000	7500	volts
DC Grid Voltage	-250	-300	volts
Peak RF Grid Voltage	920	1000	volts
DC Plate Current	0.9	0.9	amp
Driving Power (Approx.)**#	95	80	watts
Power Output (Approx.)	1.5	2	kw

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

DC PLATE VOLTAGE	6000 max.	volts
DC GRID VOLTAGE●	-1000 max.	volts
DC PLATE CURRENT	1.0 max.	amp
DC GRID CURRENT	0.25 max.	amp
PLATE INPUT	6 max.	kw
PLATE DISSIPATION	3 max.	kw

Typical Operation:

DC Plate Voltage	5000	6000	volts
DC Grid Voltage	-800	-900	volts
Peak RF Grid Voltage	1300	1420	volts
DC Plate Current	0.9	1.0	amp
DC Grid Current (Approx.)#	0.12	0.1	amp

●, **, #: See next page.

889R-A

TRANSMITTING TRIODE

Driving Power (Approx.)#.	155	140	. .	watts
Power Output (Approx.).	2.75	4	. .	kw

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

*Key-down conditions per tube without modulation***

Maximum Ratings, ***Absolute Values*****:**

DC PLATE VOLTAGE.	8500 max.	volts
DC GRID VOLTAGE●.	–1000 max.	volts
DC PLATE CURRENT.	2.0 max.	amp
DC GRID CURRENT	0.25 max.	amp
PLATE INPUT	16 max.	kw
PLATE DISSIPATION	5 max.	kw

Typical Operation:

DC Plate Voltage.	5000	6000	7500	. .	volts
DC Grid Voltage	–500	–600	–800	. .	volts
Peak RF Grid Voltage.	1240	1460	1830	. .	volts
DC Plate Current.	1.5	1.8	2.0	. .	amp
DC Grid Current (Approx.)#. .	0.19	0.21	0.24	. .	amp
Driving Power (Approx.)#. . .	220	290	400	. .	watts
Power Output (Approx.). . . .	5	7	10	. .	kw

● With ac filament excitation.

** At crest of audio-frequency cycle with modulation factor of 1.0.

Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

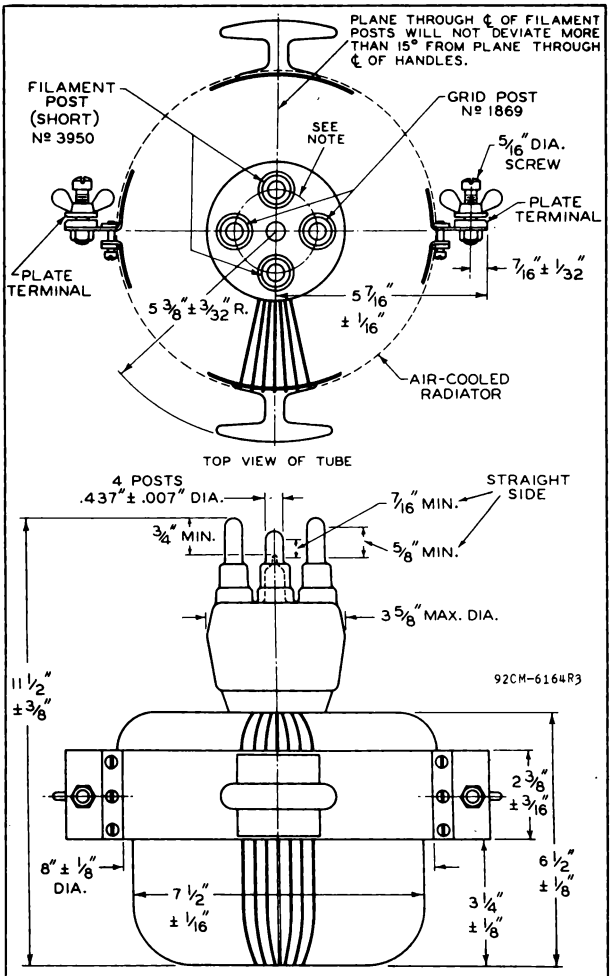
Data on operating frequencies for the 889R-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

CURVES
FOR THE 889R-A ARE THE SAME
AS THOSE FOR TYPE 889-A

889R-A

889R-A

TRANSMITTING TRIODE



NOTE: THE TUBE BASE SHALL BE CAPABLE OF ENTERING TO A DISTANCE OF 5/8" IN A FLAT-PLATE GAUGE HAVING FOUR HOLES .536" ± .001" DIAMETER ARRANGED ON A CIRCLE OF 2.125" ± .001" DIAMETER AT ANGLES OF 90° ± 10'.

891

POWER TRIODE

WATER COOLED

GENERAL DATA

Electrical:

Filament, Tungsten: Two-Section Type

Excitation . . . . . Single- or Two-Phase AC, or DC

See FILAMENT CONNECTIONS and EXCITATION CIRCUITS. When a single-phase or dc supply is used, do not connect the two filament sections in parallel. Doing so will overheat common filament lead (large terminal) and damage tube.

Voltage per Section. . . 11 . . . . . volts

Current. . . . . 60 . . . . . amp

Starting Current: The filament current should never exceed 120 amperes, even momentarily.

Cold Resistance. . . . . 0.031 . . . . . ohm ←

NOTE: This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in the General Section.

Amplification Factor . . . 8.5 ←

Direct Interelectrode Capacitances (Approx.):

Grid to Plate. . . . . 27 . . . . . μμf

Grid to Filament . . . . 19 . . . . . μμf ←

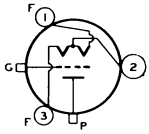
Plate to Filament. . . . 2 . . . . . μμf

Mechanical:

Terminal Connections:

Term. 1 - Filament

Term. 2 - Junction of Filament Sections, Base Shell



Term. 3 - Filament

G - Grid (Side Arm)

P - Water-Cooled Plate Terminal

Mounting Position. . . . . Vertical, Filament End Up

Maximum Overall Length . . . . . 20-7/8" ←

Maximum Radius . . . . . 6-1/2"

Water Flow . . . . . 3 to 8 gpm

The specified water flow must start before the application of any voltages, and may be removed simultaneously with the removal of all voltages. The pressure in the jacket must not exceed 80 lbs per square inch. ←

Outlet Water Temperature . . . . . 70 max. °C

Bulb Temperature . . . . . 150 max. °C ←

Components: ←

Water Jacket (Includes one gasket)	RCA MI-7415
Gasket (For Spare)	RCA MI-7440
Filament Connector (2 required).	RCA MI-7422-A
Filament-Section Junction Connector.	RCA MI-7432
Filament Terminal Block.	RCA MI-19422-7
Grid Connector	RCA MI-7422-A
Mounting Insulator	RCA MI-7424

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum CCS• Ratings, *Absolute Values:*

DC PLATE VOLTAGE . . . . . 15000 max. volts

• See next page. ← Indicates a change.

891

POWER TRIODE

MAX.-SIGNAL DC PLATE CURRENT*	2.0 max.	amp
MAX.-SIGNAL PLATE INPUT*	20000 max.	watts
PLATE DISSIPATION*	5000 max.	watts

→ **Typical Operation:**

Values are for 2 tubes

DC Plate Voltage	6000	10000	12500	volts
DC Grid Voltage	-630	-1100	-1450	volts
Peak AF Grid-to-Grid Volt.	2060	3060	3760	volts
Zero-Sig. DC Plate Current	0.5	0.5	0.4	amp
Max.-Sig. DC Plate Current	2.5	2.4	2.5	amp
Effective Load Resistance (Plate to plate)	5000	10000	12000	ohms
Max.-Signal Driving Power (Approx.)#	110	225	245	watts
Max.-Signal Power Output (Approx.)	8000	16000	22000	watts

RF POWER AMPLIFIER & OSCILLATOR—Class C Telegraphy

Key-down conditions per tube without amplitude modulation##

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	12000 max.	volts
DC GRID VOLTAGE	-3000 max.	volts
DC PLATE CURRENT	2 max.	amp
DC GRID CURRENT	0.15 max.	amp
PLATE INPUT	18000 max.	watts
PLATE DISSIPATION	6000 max.	watts

→ **Typical Operation:**

DC Plate Voltage	8000	10000	volts
DC Grid Voltage	-1800	-2000	volts
From a grid resistor of	20000	14300	ohms
From a cathode resistor of	1450	1360	ohms
Peak RF Grid Voltage	2400	2700	volts
DC Plate Current	1.15	1.33	amp
DC Grid Current (Approx.)°	0.09	0.14	amp
Driving Power (Approx.)°	215	375	watts
Power Output (Approx.)	6500	10000	watts

● Continuous Commercial Service.

* Averaged over any audio-frequency cycle of sine-wave form.

\# The driving stage should have good regulation and should be capable of supplying considerably more than the required driving power.

\## Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

° For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—*Grid Current and Driving Power* in the General Section.

→ Indicates a change.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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POWER TRIODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	57	62	amp
Amplification Factor	1,2	7.6	9.4	
Grid-Plate Capacitance	-	24	31	μμf
Grid-Filament Capacitance	-	15	23	μμf
Plate-Filament Capacitance	-	1	3	μμf
Plate Voltage	1,3	1600	2200	volts
Plate Voltage	1,4	9500	11500	volts
Grid Voltage	1,5	-1500	-1850	volts
Grid Voltage	1,6	-	875	volts
Peak Cathode Current	7	9	-	amp
Grid Current	1,6	-	1.5	amp
Useful Power Output	1,8	12000	-	watts

Note 1: With 22 volts ac on filament connected for single-phase operation.

Note 2: With dc grid voltage of -500 volts and dc plate voltage adjusted to give dc plate current of 0.75 amp.

Note 3: With dc grid voltage of 0 volts, and dc plate voltage adjusted to give dc plate current of 0.75 amp.

Note 4: With dc grid voltage of -1000 volts, and dc plate voltage adjusted to give dc plate current of 0.75 amp.

Note 5: With dc plate voltage of 12000 volts, and dc grid voltage adjusted to give dc plate current of 20 ma.

Note 6: With dc plate voltage of 1500 volts, and instantaneous grid voltage adjusted to give instantaneous plate current of 6.0 amp.

Note 7: Represents the maximum usable cathode current (plate current and grid current) for the tube under any condition of operation.

Note 8: With dc plate voltage of 12000 volts, dc plate current of 1.5 amp., dc grid current of 0.10 amp., grid resistor of 19000 ± 10% ohms, and frequency of 1.5 megacycles/second.

Data on operating frequencies for the 891 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

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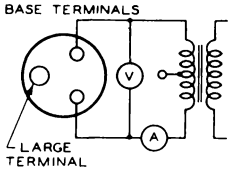
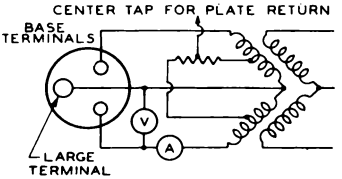
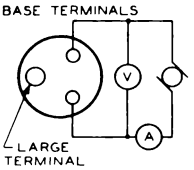
FILAMENT CONNECTIONS AND EXCITATION CIRCUITS

WITH SINGLE-PHASE A-C EXCITATION	 V = 22 VOLTS A = 60 AMPERES
WITH TWO-PHASE (QUARTER PHASE) A-C EXCITATION	 V = 11 VOLTS A = 60 AMPERES
WITH D-C EXCITATION	 V = 22 VOLTS A = 60 AMPERES

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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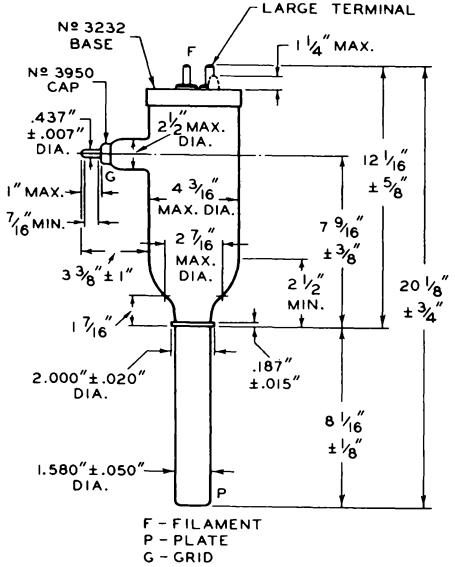
POWER TRIODE



92CM-4627R4

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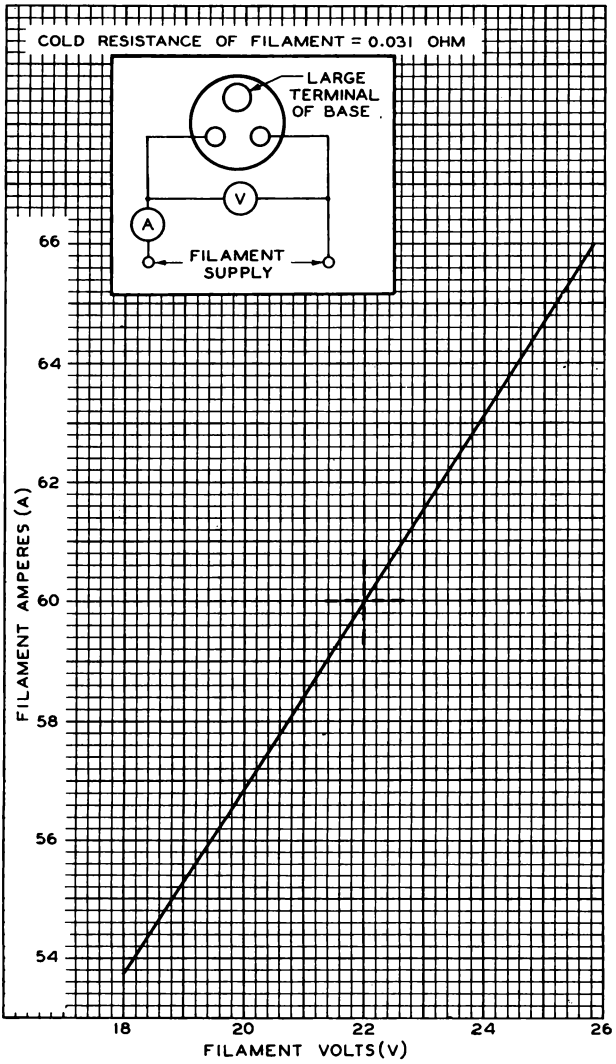
AVERAGE FILAMENT CHARACTERISTIC



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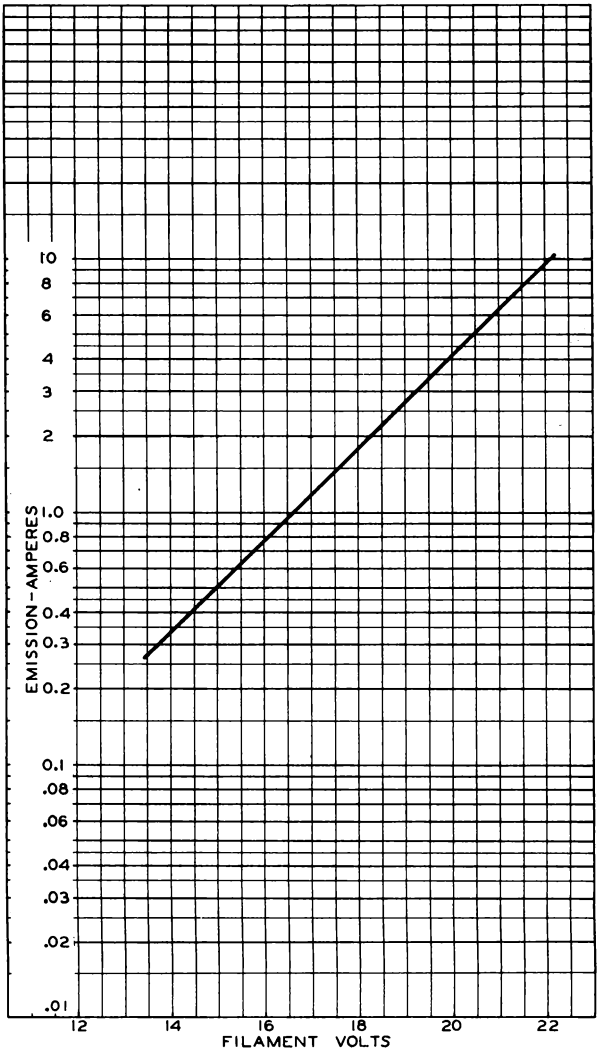
AVERAGE FILAMENT-EMISSION CHARACTERISTIC



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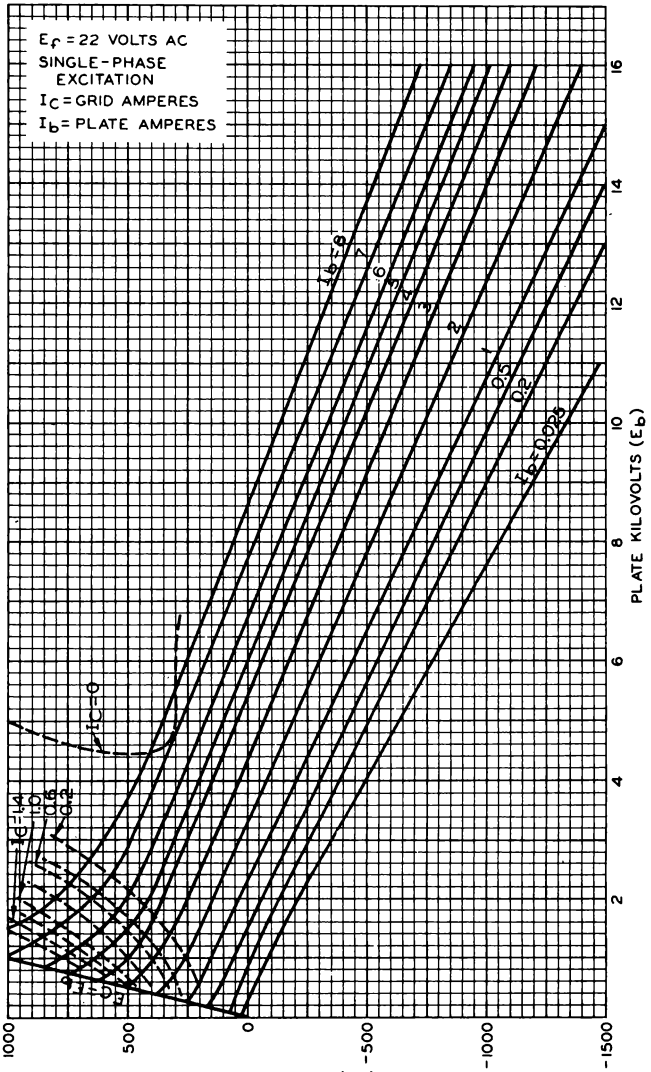
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



DEC. 13, 1949

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6134R1

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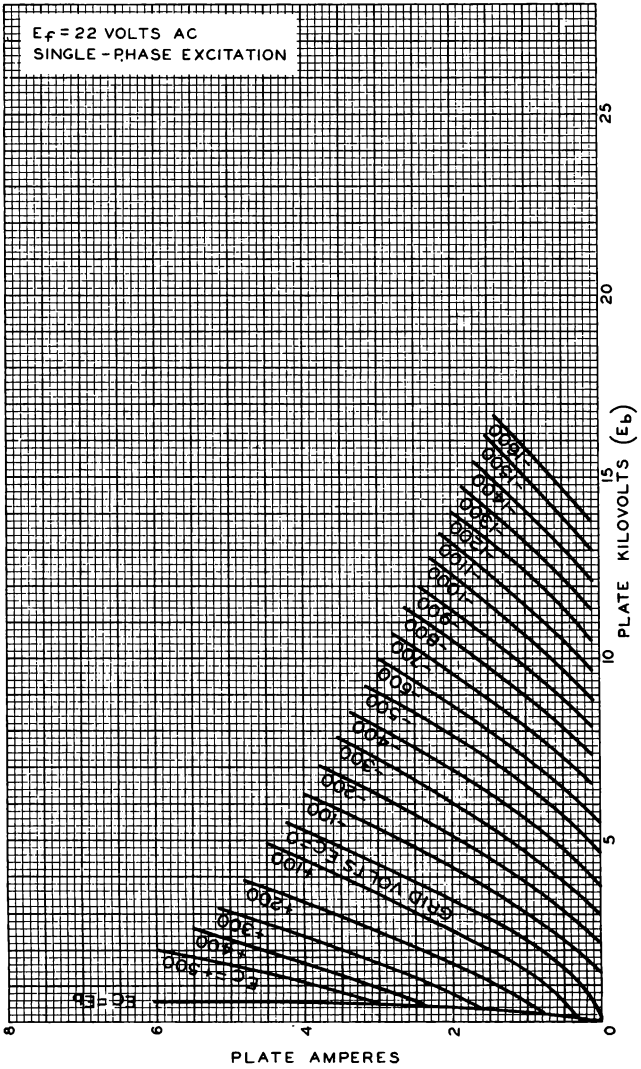
AVERAGE PLATE CHARACTERISTICS



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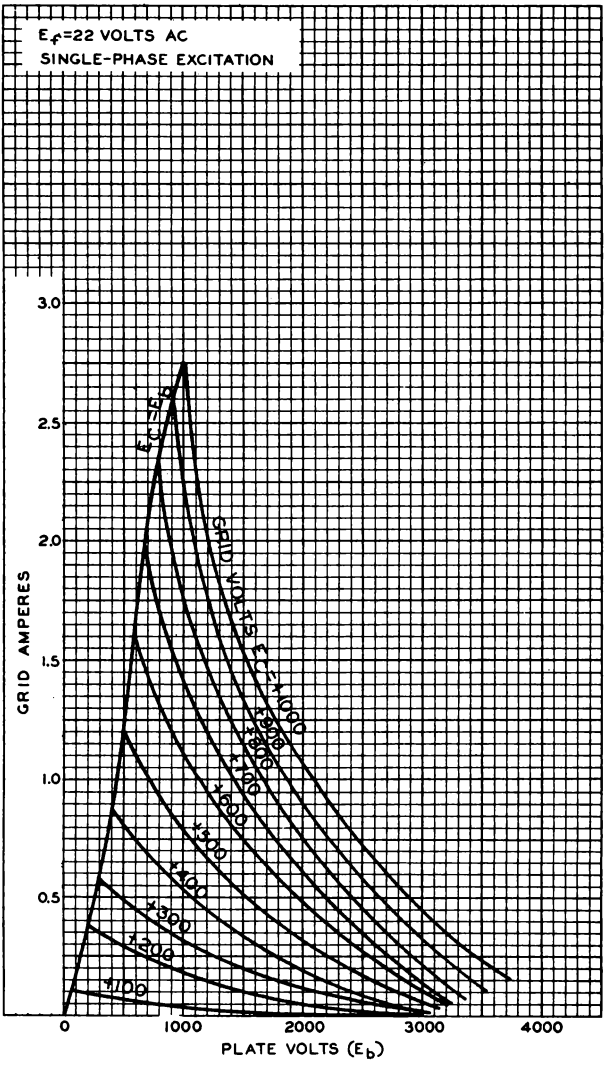
TYPICAL GRID CHARACTERISTICS



891-R

POWER TRIODE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament, Tungsten: Two-Section Type

Excitation . . . . . Single- or Two-Phase AC, or DC

See FILAMENT CONNECTIONS and EXCITATION CIRCUITS under Type 891. When a single-phase or dc supply is used, do not connect the two filament sections in parallel. Doing so will overheat common filament lead (large terminal) and damage tube.

Voltage per Section. . . 11 . . . . . volts

Current. . . . . 60 . . . . . amp

Starting Current: The filament current should never exceed 120 amperes, even momentarily.

Cold Resistance. . . . . 0.031 . . . . . ohm ←

NOTE: This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in the General Section.

Amplification Factor . . . 8.5 ←

Direct Interelectrode Capacitances (Approx.): ←

Grid to Plate. . . . . 28 . . . . . μμf

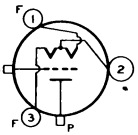
Grid to Filament . . . . 19 . . . . . μμf

Plate to Filament. . . . 2.5 . . . . . μμf

Mechanical:

Terminal Connections:

Term. 1 - Filament
Term. 2 - Junction of Filament Sections, Base Shell



Term. 3 - Filament
G - Grid (Side Arm)
P - Radiator-Cooled Plate Terminal

Mounting Position. . . . . Vertical, Filament End Up

Maximum Overall Length . . . . . 22"

Maximum Radius . . . . . 6-1/2"

Radiator . . . . . Integral Part of Tube

Air Flow: ←

Through Radiator - The specified air flow for various values of plate dissipation as indicated below should be delivered by a blower before and during the application of any voltages. Filament power, plate power, and air may be removed simultaneously.

Plate Dissipation	2400	3200	4000	. . .	watts
Air Flow	300	380	450	. . .	cfm
Static Pressure.	0.20	0.36	0.5		inches of water

Incoming Air Temperature . . . . . 45 max. °C

Radiator Temperature (Measured in thermometer well). . . . . 180 max. °C

Bulb Temperature . . . . . 150 max. °C ←

Components: ←

Air Jacket . . . . . RCA MI-19422-A

Air Manifold . . . . . RCA MI-27017-A

Bracelet (For canvas boot) . . . . . RCA MI-27016-A

← Indicates a change.

891-R
POWER TRIODE

Filament Connector (2 required)	RCA MI-7422-A
Filament-Section Junction Connector	RCA MI-7432
Filament Terminal Block	RCA MI-19422-7
Grid Connector	RCA MI-7422-A

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	10000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	2 max.	amp
MAX.-SIGNAL PLATE INPUT*	10500 max.	watts
PLATE DISSIPATION*	3500 max.	watts

→ **Typical Operation:**

Values are for 2 tubes

DC Plate Voltage	6000	8000	volts
DC Grid Voltage	-630	-860	volts
Peak AF Grid-to-Grid Voltage	2060	2260	volts
Zero-Signal DC Plate Current	0.5	0.5	amp
Max.-Signal DC Plate Current	2.5	2.1	amp
Effective Load Resistance (Plate to plate)	5000	8000	ohms
Max.-Signal Driving Power (Approx.)#	110	50	watts
Max.-Signal Power Output (Approx.)	8000	10000	watts

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without amplitude modulation##

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	10000 max.	volts
DC GRID VOLTAGE	-3000 max.	volts
DC PLATE CURRENT	2 max.	amp
DC GRID CURRENT	0.15 max.	amp
PLATE INPUT	15000 max.	watts
PLATE DISSIPATION	4000 max.	watts

→ **Typical Operation:**

DC Plate Voltage	8000	10000	volts
DC Grid Voltage	-1800	-2000	volts
From a grid resistor of	20000	14300	ohms
From a cathode resistor of	1460	1360	ohms
Peak RF Grid Voltage	2400	2700	volts
DC Plate Current	1.14	1.33	amp

● Continuous Commercial Service.

* Averaged over any audio-frequency cycle of sine-wave form.

\# The driving stage should have good regulation and should be capable of supplying considerably more than the required driving power.

\## Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

→ Indicates a change.

891-R

POWER TRIODE

DC Grid Current (Approx.)°	0.09	0.14	amp
Driving Power (Approx.)°	215	375	watts
Power Output (Approx.)	6500	10000	watts

° For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—*Grid Current and Driving Power* in the General Section.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	57	62	amp
Amplification Factor	1,2	7.6	9.4	
Grid-Plate Capacitance	–	25	32	μμf
Grid-Filament Capacitance. . . .	–	15	23	μμf
Plate-Filament Capacitance . . .	–	1.5	3.5	μμf
Plate Voltage.	1,3	1200	1750	volts
Plate Voltage.	1,4	8800	10800	volts
Grid Voltage	1,5	-1500	-1850	volts
Grid Voltage	1,6	–	875	volts
Peak Cathode Current	7	9	–	amp
Grid Current	1,6	–	1.5	amp
Useful Power Output.	1,8	10000	–	watts

Note 1: With 22 volts ac on filament connected for single-phase operation.

Note 2: With dc grid voltage of -500 volts and dc plate voltage adjusted to give dc plate current of 0.45 amp.

Note 3: With dc grid voltage of 0 volts, and dc plate voltage adjusted to give dc plate current of 0.45 amp.

Note 4: With dc grid voltage of -1000 volts, and dc plate voltage adjusted to give dc plate current of 0.45 amp.

Note 5: With dc plate voltage of 12000 volts, and dc grid voltage adjusted to give dc plate current of 20 ma.

Note 6: With dc plate voltage of 1500 volts, and instantaneous grid voltage adjusted to give instantaneous plate current of 6.0 amp.

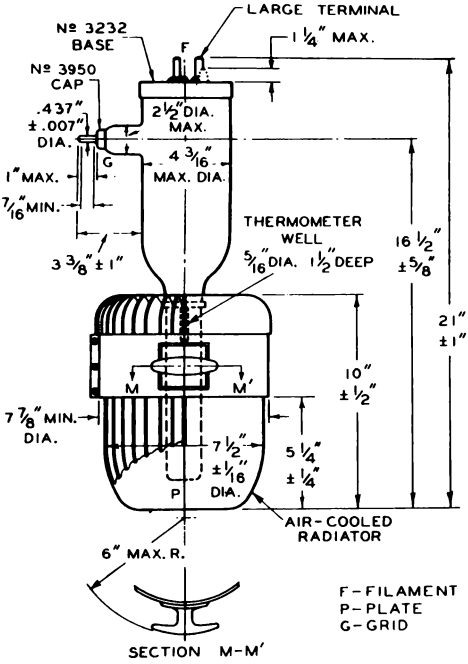
Note 7: Represents the maximum usable cathode current (plate current and grid current) for the tube under any condition of operation.

Note 8: With dc plate voltage of 10000 volts, dc plate current of 1.4 amp., dc grid current of 0.10 amp., grid resistor of 19000 ± 10% ohms, and frequency of 1.5 megacycles/second.

Data on operating frequencies for the 891-R are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

Average Filament-Emission Characteristic Curve,
Average Filament Characteristic Curve,
and
Average Characteristic Curves
are the same as shown for Type 891

891-R
POWER TRIODE



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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POWER TRIODE

WATER COOLED

GENERAL DATA

Electrical:

Filament, Tungsten: Two-Section Type

Excitation . . . . . Single- or Two-Phase AC, or DC

See FILAMENT CONNECTIONS and EXCITATION CIRCUITS under Type 891. When a single-phase or dc supply is used, do not connect the two filament sections, in parallel. Doing so will overheat common filament lead (large terminal) and damage tube.

Voltage per Section. . . 11 . . . . . volts

Current. . . . . 60. . . . . amp

Starting Current: The filament current should never exceed 120 amperes, even momentarily.

Cold Resistance. . . . . 0.031 . . . . . ohm ←

NOTE: This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in the General Section.

Amplification Factor . . . 50

Direct Interelectrode Capacitances (Approx.): ←

Grid to Plate. . . . . 30 . . . . . μμf

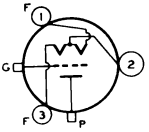
Grid to Filament . . . . 20 . . . . . μμf

Plate to Filament. . . . 1.5 . . . . . μμf

Mechanical:

Terminal Connections:

Term. 1 - Filament
Term. 2 - Junction of Filament Sections, Base Shell



Term. 3 - Filament
G - Grid (Side Arm)
P - Water-Cooled Plate Terminal

Mounting Position . . . . . Vertical, Filament End Up

Maximum Overall Length. . . . . 20-7/8" ←

Maximum Radius. . . . . 6-1/2"

Water Flow. . . . . 3 to 8 gpm

The specified water flow must start before the application of any voltages, and may be removed simultaneously with the removal of all voltages. The pressure in the jacket must not exceed 80 lbs per square inch. ←

Outlet Water Temperature. . . . . 70 max. °C

Bulb Temperature. . . . . 150 max. °C ←

Components: ←

Water Jacket (Includes one gasket). . . . . RCA MI-7415

Gasket (For spare). . . . . RCA MI-7440

Filament Connector (2 required) . . . . . RCA MI-7422-A

Filament-Section Junction Connector . . . . . RCA MI-7432

Filament Terminal Block . . . . . RCA MI-19422-7

Grid Connector. . . . . RCA MI-7422-A

Mounting Insulator. . . . . RCA MI-7424

←- Indicates a change.

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POWER TRIODE

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	15000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	2.0 max.	amp
MAX.-SIGNAL PLATE INPUT*	20000 max.	watts
PLATE DISSIPATION*	7500 max.	watts

→ **Typical Operation:**

Values are for 2 tubes

DC Plate Voltage	6000	10000	12500	volts
DC Grid Voltage†	0	-90	-170	volts
Peak AF Grid-to-Grid Voltage	1000	1380	1370	volts
Zero-Signal DC Plate Current	0.5	0.5	0.4	amp
Max.-Signal DC Plate Current	2.6	3.3	2.8	amp
Effective Load Resistance (Plate to plate)	4200	6400	10000	ohms
Max.-Signal Driving Power (Approx.)#	135	240	160	watts
Max.-Signal Power Output (Approx.)	8000	20000	22000	watts

RF POWER AMPLIFIER – Class B Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1.0

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	15000 max.	volts
DC PLATE CURRENT	1.0 max.	amp
PLATE INPUT	15000 max.	watts
PLATE DISSIPATION	10000 max.	watts

→ **Typical Operation:**

DC Plate Voltage	6000	10000	14000	volts
DC Grid Voltage†	0	-100	-190	volts
Peak RF Grid Voltage	230	370	440	volts
DC Plate Current	0.64	0.77	0.82	amp
DC Grid Current (Approx.)○	0.03	0.06	0.03	amp
Driving Power (Approx.)▲○	77	133	106	watts
Power Output (Approx.)	1000	2500	4000	watts

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1.0

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	10000 max.	volts

* Averaged over any audio-frequency cycle of sine-wave form.

† With ac on filament.

\# The driving stage should have good regulation and should be capable of supplying considerably more than the required driving power.

▲ At the crest of audio-frequency cycle with modulation factor of 1.0.

●, ○: See next page. → Indicates a change.

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POWER TRIODE

DC GRID VOLTAGE	-3000 max.		volts
DC PLATE CURRENT	1.0 max.		amp
DC GRID CURRENT	0.3 max.		amp ←
PLATE INPUT	10000 max.		watts
PLATE DISSIPATION	6600 max.		watts

Typical Operation: ←

DC Plate Voltage	6000	8000	10000	volts
DC Grid Voltage	-1000	-1300	-1600	volts
From a grid resistor of	3570	5420	6960	ohms
Peak RF Grid Voltage	1650	1950	2250	volts
DC Plate Current	0.83	0.82	0.78	amp
DC Grid Current (Approx.)°	0.28	0.24	0.23	amp
Driving Power (Approx.)°	420	430	460	watts
Power Output (Approx.)	3500	5000	6000	watts

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without amplitude modulation##

Maximum CCS• Ratings, *Absolute Values*:

DC PLATE VOLTAGE	15000 max.	volts
DC GRID VOLTAGE	-3000 max.	volts
DC PLATE CURRENT	2.0 max.	amp
DC GRID CURRENT	0.4 max.	amp ←
PLATE INPUT	30000 max.	watts
PLATE DISSIPATION	10000 max.	watts

Typical Operation: ←

DC Plate Voltage	8000	10000	12000	volts
DC Grid Voltage	-1000	-1300	-1600	volts
From a grid resistor of	4540	5420	6960	ohms
From a cathode resistor of	720	790	900	ohms
Peak RF Grid Voltage	1700	2150	2550	volts
DC Plate Current	1.17	1.4	1.55	amp
DC Grid Current (Approx.)°	0.22	0.24	0.23	amp
Driving Power (Approx.)°	330	495	565	watts
Power Output (Approx.)	6500	10000	14000	watts

• Continuous Commercial Service.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

° For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—*Grid Current and Driving Power* in the General Section.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	57	62	amp
Amplification Factor	1,2	42.5	57.5	
Grid-Plate Capacitance	-	27	33	μμf
Grid-Filament Capacitance	-	15	24	μμf
Plate-Filament Capacitance	-	0.5	2.5	μμf

← Indicates a change.

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POWER TRIODE

	Note	Min.	Max.	
Plate Voltage.	1,3	7500	11000	volts
Plate Voltage.	1,4	12000	16500	volts
Grid Voltage	1,5	-240	-400	volts
Grid Voltage	1,6	-	925	volts
Peak Cathode Current	7	9	-	amp
Grid Current	1,6	-	1.75	amp
Useful Power Output.	1,8	20000	-	watts

Note 1: With 22 volts ac on filament connected for single-phase operation.

Note 2: With dc grid voltage of -50 volts and dc plate voltage adjusted to give dc plate current of 0.75 amp.

Note 3: With dc grid voltage of 0 volts, and dc plate voltage adjusted to give dc plate current of 0.75 amp.

Note 4: With dc grid voltage of -100 volts, and dc plate voltage adjusted to give dc plate current of 0.75 amp.

Note 5: With dc plate voltage of 15000 volts, and dc grid voltage adjusted to give dc plate current of 20 ma.

Note 6: With dc plate voltage of 1500 volts, and instantaneous grid voltage adjusted to give instantaneous plate current of 6.0 amp.

Note 7: Represents the maximum usable cathode current (plate current and grid current) for the tube under any condition of operation.

Note 8: With dc plate voltage of 15000 volts, dc plate current of 2.0 amp., dc grid current of 0.25 amp., grid resistor of 5000 ± 10% ohms, and frequency of 1.5 megacycles/second.

Data on operating frequencies for the 892 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

Outline Drawing for the 892 is the same as shown for Type 891

Average Filament-Emission Characteristic Curve
and
Average Filament Characteristic Curve
are the same as shown for Type 891

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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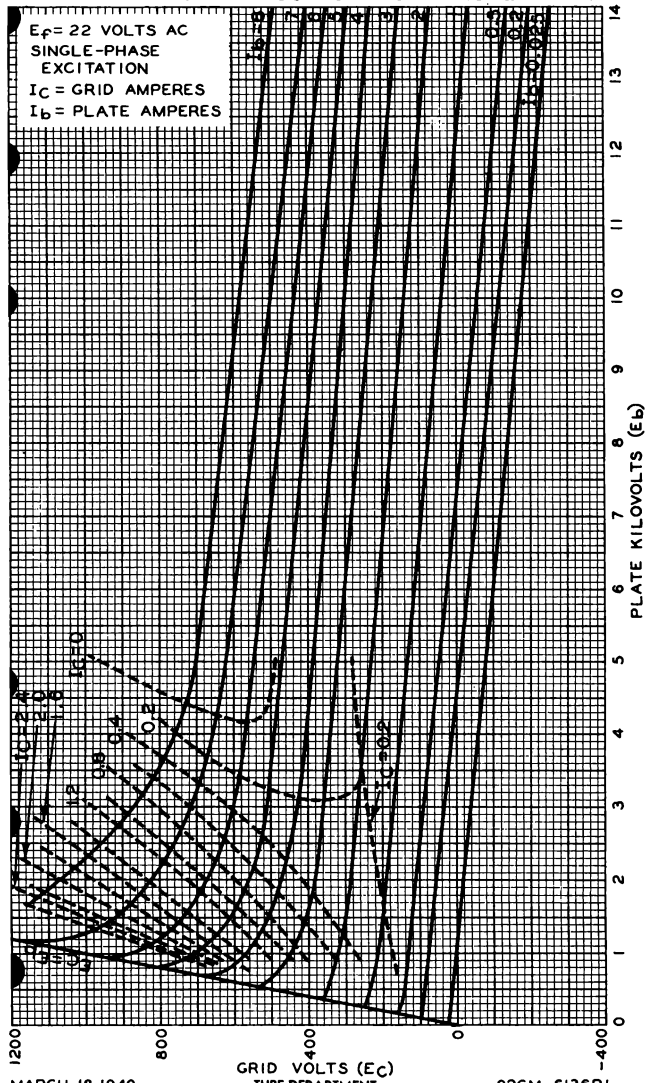
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



MARCH 18,1949

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6136R1

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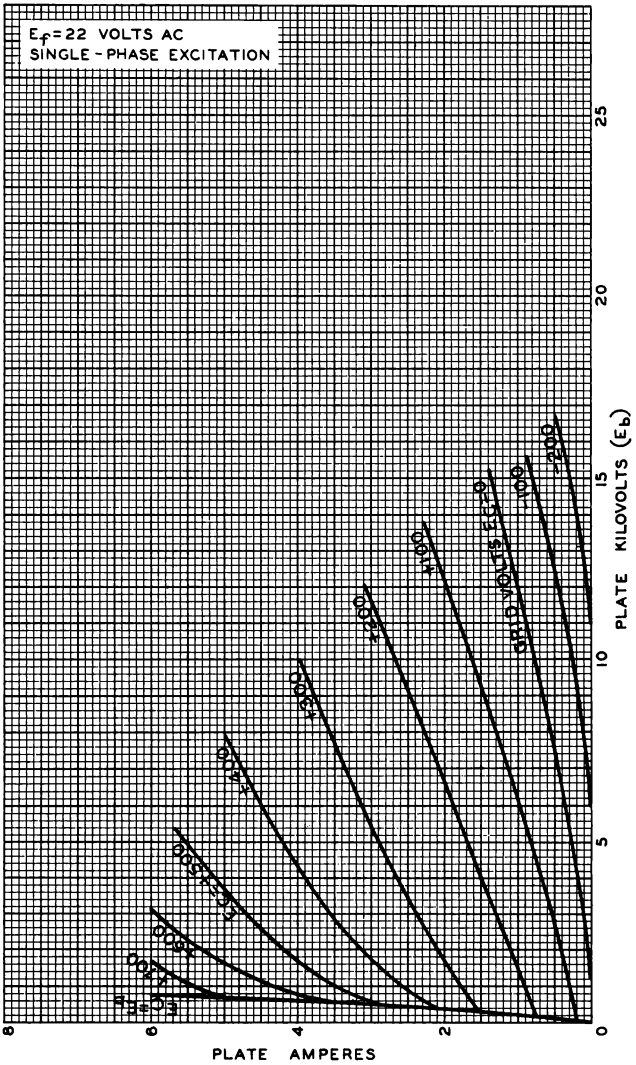
AVERAGE PLATE CHARACTERISTICS



MAR.17,1949 TUBE DEPARTMENT 92CM-4641R3

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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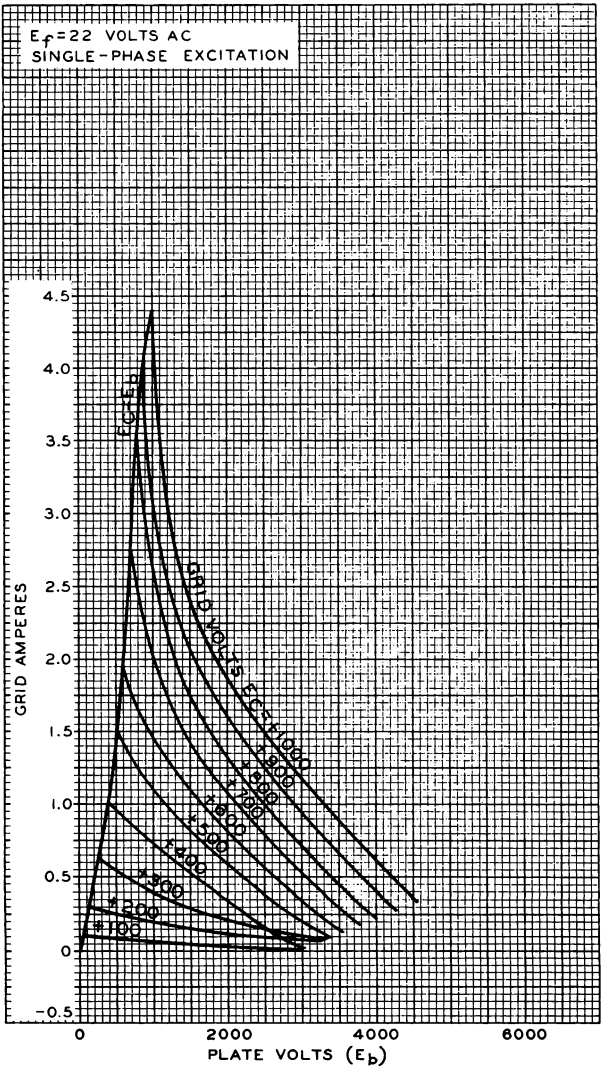
TYPICAL GRID CHARACTERISTICS



892-R

892-R

POWER TRIODE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament, Tungsten: Two-Section Type

Excitation . . . . . Single- or Two-Phase AC, or DC

See FILAMENT CONNECTIONS and EXCITATION CIRCUITS under Type 891. When a single-phase or dc supply is used, do not connect the two filament sections in parallel. Doing so will overheat common filament lead (large terminal) and damage tube.

Voltage per Section. . . 11 . . . . . volts

Current. . . . . 60 . . . . . amp

Starting Current: The filament current should never exceed 120 amperes, even momentarily.

Cold Resistance. . . . . 0.031 . . . . . ohm ←

NOTE: This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in the General Section.

Amplification Factor . . . 50

Direct Interelectrode Capacitances (Approx.): ←

Grid to Plate. . . . . 31 . . . . . μμf

Grid to Filament . . . . 20 . . . . . μμf

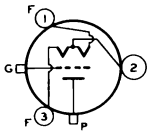
Plate to Filament. . . . 2 . . . . . μμf

Mechanical:

Terminal Connections:

Term. 1 - Filament

Term. 2 - Junction of Filament Sections, Base Shell



Term. 3 - Filament

G - Grid (Side Arm)

P - Radiator-Cooled Plate Terminal

Mounting Position. . . . . Vertical, Filament End Up

Maximum Overall Length . . . . . 22"

Maximum Radius . . . . . 6-1/2"

Radiator . . . . . Integral Part of Tube

Air Flow: ←

Through Radiator - The specified air flow for various values of plate dissipation as indicated below should be delivered by a blower before and during the application of any voltages. Filament power, plate power, and air may be removed simultaneously.

Plate Dissipation	2400	3200	4000	. . .	watts
Air Flow	300	380	450	. . .	cfm
Static Pressure. .	0.20	0.36	0.5		inches of water

Incoming Air Temperature . . . . . 45 max. °C

Radiator Temperature (Measured in thermometer well). . . . 180 max. °C

Bulb Temperature . . . . . 150 max. °C ←

Components: ←

Air Jacket . . . . . RCA MI-19422-A

← Indicates a change.

892-R
POWER TRIODE

Air Manifold	RCA MI-27017-A
Bracelet (For canvas boot)	RCA MI-27016-A
Filament Connector (2 required)	RCA MI-7422-A
Filament-Section Junction Connector	RCA MI-7432
Filament Terminal Block	RCA MI-19422-7
Grid Connector	RCA MI-7422-A

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	12500 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	2.0 max.	amp
MAX.-SIGNAL PLATE INPUT*	12000 max.	watts
PLATE DISSIPATION*	4000 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	6000	8000	volts
DC Grid Voltage†	0	-60	volts
Peak AF Grid-to-Grid Voltage	1200	1000	volts
Zero-Signal DC Plate Current	0.5	0.5	amp
→ Max.-Signal DC Plate Current	2.6	2.3	amp
Effective Load Resistance (Plate to plate)	4200	6800	ohms
→ Max.-Sig. Driving Power (Approx.)#	135	84	watts
Max.-Sig. Power Output (Approx.)	8000	10500	watts

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	12500 max.	volts
DC PLATE CURRENT	1.0 max.	amp
PLATE INPUT	6000 max.	watts
PLATE DISSIPATION	4000 max.	watts

→ **Typical Operation:**

DC Plate Voltage	6000	8000	volts
DC Grid Voltage†	0	-60	volts
Peak RF Grid Voltage	230	320	volts
DC Plate Current	0.64	0.67	amp
DC Grid Current (Approx.)○	0.03	0.04	amp
Driving Power (Approx.)▲○	77	150	watts
Power Output (Approx.)	1000	1800	watts

* Averaged over any audio-frequency cycle of sine wave form.

† With ac on filament.

\# The driving stage should have good regulation and should be capable of supplying considerably more than the required driving power.

▲ At crest of audio-frequency cycle with modulation factor of 1.0.

●,○: See next page.

→ Indicates a change.

892-R

POWER TRIODE

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1.0

Maximum CCS• Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	10000 max.	volts
DC GRID VOLTAGE	-3000 max.	volts
DC PLATE CURRENT	1.0 max.	amp
DC GRID CURRENT	0.3 max.	amp ←
PLATE INPUT	10000 max.	watts
PLATE DISSIPATION	2500 max.	watts

Typical Operation: ←

DC Plate Voltage	6000	8000	volts
DC Grid Voltage	-1000	-1300	volts
From a grid resistor of	3570	5420	ohms
Peak RF Grid Voltage	1650	1950	volts
DC Plate Current	0.83	0.82	amp
DC Grid Current (Approx.)°	0.28	0.24	amp
Driving Power (Approx.)°	420	430	watts
Power Output (Approx.)	3500	5000	watts

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without amplitude modulation##

Maximum CCS• Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	12500 max.	volts
DC GRID VOLTAGE	-3000 max.	volts
DC PLATE CURRENT	2.0 max.	amp
DC GRID CURRENT	0.4 max.	amp ←
PLATE INPUT	18000 max.	watts
PLATE DISSIPATION	4000 max.	watts

Typical Operation: ←

DC Plate Voltage	8000	10000	volts
DC Grid Voltage	-1000	-1300	volts
From a grid resistor of	4540	5420	ohms
From a cathode resistor of	720	790	ohms
Peak RF Grid Voltage	1700	2150	volts
DC Plate Current	1.17	1.40	amp
DC Grid Current (Approx.)°	0.22	0.24	amp
Driving Power (Approx.)°	330	495	watts
Power Output (Approx.)	6500	10000	watts

• Continuous Commercial Service.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

° For effect of load resistance on grid current and driving power, refer to TUBE RATINGS--*Grid Current and Driving Power* in the General Section.

← Indicates a change.

892-R

POWER TRIODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	57	62	amp
Amplification Factor	1,2	42.5	57.5	
Grid-Plate Capacitance . . .	-	28	34	μμf
Grid-Filament Capacitance. .	-	15	24	μμf
Plate-Filament Capacitance .	-	1.0	3.0	μμf
Plate Voltage.	1,3	5000	7400	volts
Plate Voltage.	1,4	9200	13200	volts
Grid Voltage	1,5	-240	-400	volts
Grid Voltage	1,6	-	925	volts
Peak Cathode Current	7	9	-	amp
Grid Current	1,6	-	1.75	amp
Useful Power Output.	1,8	10000	-	watts

Note 1: With 22 volts ac on filament connected for single-phase operation.

Note 2: With dc grid voltage of -50 volts and dc plate voltage adjusted to give dc plate current of 0.42 amp.

Note 3: With dc grid voltage of 0 volts, and dc plate voltage adjusted to give dc plate current of 0.42 amp.

Note 4: With dc grid voltage of -100 volts, and dc plate voltage adjusted to give dc plate current of 0.42 amp.

Note 5: With dc plate voltage of 15000 volts, and dc grid voltage adjusted to give dc plate current of 20 ma.

Note 6: With dc plate voltage of 1500 volts, and instantaneous grid voltage adjusted to give instantaneous plate current of 6.0 amp.

Note 7: Represents the maximum usable cathode current (plate current and grid current) for the tube under any condition of operation.

Note 8: With dc plate voltage of 10000 volts, dc plate current of 1.4 amp., dc grid current of 0.25 amp., grid resistor of 5000 ± 10% ohms, and frequency of 1.5 megacycles/second.

Data on operating frequencies for the 892-R are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

Outline Drawing for the 892-R is the same as shown for Type 891-R

Average Filament-Emission Characteristic Curve
and
Average Filament Characteristic Curve
are the same as shown for Type 891

Average Characteristics Curves
are the same as shown for Type 892

893-A

TRANSMITTING TRIODE

WATER & FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament: Tungsten, Three-Section Type
Excitation . . 1φAC, 3φAC, 6φAC, or DC
Voltage per strand . . . . 10 . . . . . volts
Current per terminal . . . 61 . . . . . amp.
(See FILAMENT CONNECTIONS AND EXCITATION CIRCUITS under this type)
Starting – The current per terminal must never exceed 120 amperes, even momentarily.

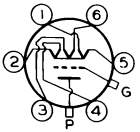
Amplification Factor 36

Direct Interelectrode Capacitances (Approx.):
Grid to Plate. . . . . 33 . . . . . μμf
Grid to Filament . . . . . 48 . . . . . μμf
Plate to Filament. . . . . 3.2 . . . . . μμf

Physical:

Terminal Connections:
Term.1 - Fil. No.3
Term.2 - Fil. No.2
Term.3 - Fil. No.1
Term.4 - Fil. No.2
Term.5 - Fil. No.3
Term.6 - Fil. No.1

TOP VIEW



G - Grid Cap Terminal

P - Water-cooled Plate Terminal

TERMINAL No5 IS ABOVE GRID ARM

Mounting Position. . . . . Vertical only, glass end up
Overall Length . . . . . 25-5/8" ± 1-1/8"
Greatest Radius. . . . . 6" ± 3/8"
Cap. No.3935
Base (with nozzle for air-cooling of filament seal) No.6628
Water Jacket . . . . . Type UT-1290-A
Gasket . . . . . RCA Stock No.17880
Cooling – *Water flow* of 8 to 15 gallons per minute must start before application of any voltages and continue for at least 2 minutes after removal of voltages. Water temperature must not exceed 70°C under any conditions of operation.
Air flow of 2 cubic feet per minute in nozzle of filament base before application of any voltages is required to limit temperature of filament seal to 150°C.

This tube can often be operated at reduced filament voltage as explained on sheet TYPES OF CATHODES in General Section.

A-F POWER AMPLIFIER & MODULATOR - Class B

Maximum Ratings, ***Absolute Values:***

D-C PLATE VOLTAGE. . . . . 20000 max. . volts
MAX.-SIGNAL D-C PLATE CURRENT* . . . . . 4 max. . amp.
MAX.-SIGNAL PLATE INPUT* . . . . . 60 max. . . kw
PLATE DISSIPATION* . . . . . 20 max. . . kw

Typical Operation:

Unless otherwise specified, values are for 2 tubes

D-C Plate Voltage. . . . . 12000 15000 18000 . . . volts

* Averaged over any audio-frequency cycle of sine-wave form.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

893-A

TRANSMITTING TRIODE

(continued from preceding page)

D-C Grid Voltage	-260	-350	-450	. . . volts
Peak A-F Grid-to-Grid Voltage.	1480	1560	1720	. . . volts
Zero-Sig. D-C Plate Cur. .	0.8	0.8	0.8	. . . amp.
Max.-Sig. D-C Plate Cur. .	7.0	6.0	5.5	. . . amp.
Effective Load Res. (plate-to-plate)	4000	6000	8000	. . . ohms
Max.-Signal Driving Power.	220	190	140	approx. watts
Max.-Signal Power Output .	52	60	70	approx. kw

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

D-C PLATE VOLTAGE.	20000 max.	. volts
D-C PLATE CURRENT.	2 max.	. amp.
PLATE INPUT.	32 max.	. . kw
PLATE DISSIPATION.	20 max.	. . kw

Typical Operation:

D-C Plate Voltage.	12000	15000	15000	. . . volts
D-C Grid Voltage	-250	-340	-340	. . . volts
Peak R-F Grid Voltage. . .	350	395	450	. . . volts
D-C Plate Current.	1.5	1.5	2.0	. . . amp.
Driving Power # **	130	150	200	approx. watts
Power Output #	6	7.5	10	approx. kw

**At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

D-C PLATE VOLTAGE.	12000 max.	. volts
D-C GRID VOLTAGE	-3000 max.	. volts
D-C PLATE CURRENT.	2 max.	. amp.
D-C GRID CURRENT	0.4 max.	. amp.
PLATE INPUT.	24 max.	. . kw
PLATE DISSIPATION.	12 max.	. . kw

Typical Operation:

D-C Plate Voltage.	10000	10000	12000	. . . volts
D-C Grid Voltage	-800	-800	-1000	. . . volts
Peak R-F Grid Voltage. . .	1200	1280	1500	. . . volts
D-C Plate Current.	1.5	2.0	2.0	. . . amp.
D-C Grid Current #	0.10	0.16	0.14	approx. amp.
Driving Power #	120	210	210	approx. watts
Power Output	11	15	18	approx. kw

: See next page.

893-A

TRANSMITTING TRIODE

(continued from preceding page)

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation **

Maximum Ratings, ***Absolute Values*:**

D-C PLATE VOLTAGE	20000 max.	volts
D-C GRID VOLTAGE	-3000 max.	volts
D-C PLATE CURRENT	4 max.	amp.
D-C GRID CURRENT	0.4 max.	amp.
PLATE INPUT	70 max.	kw
PLATE DISSIPATION	20 max.	kw

Typical Operation:

D-C Plate Voltage	12000	15000	18000	volts
D-C Grid Voltage	-800	-900	-1000	volts
Peak R-F Grid Voltage	1430	1520	1630	volts
D-C Plate Current	3.5	3.6	3.6	amp.
D-C Grid Current #	0.26	0.25	0.21	approx. amp.
Driving Power #	360	370	340	approx. watts
Power Output	30	40	50	approx. kw

Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

**Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

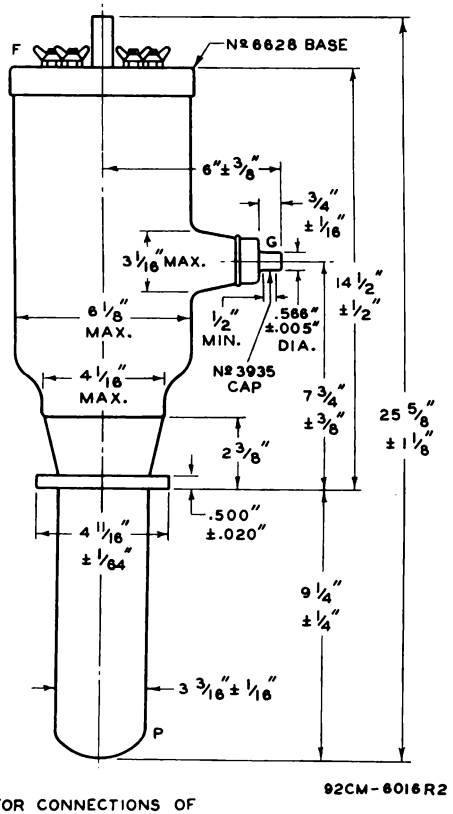
Data on operating frequencies for the 893-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

CURVES
FOR THE 893-A ARE THE SAME AS
THOSE FOR TYPE 893A-R

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

893-A

TRANSMITTING TRIODE

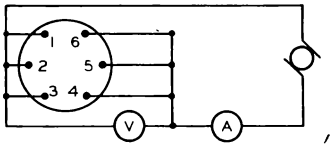
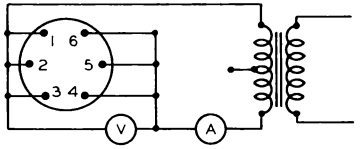
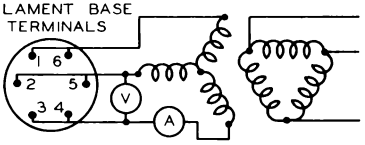
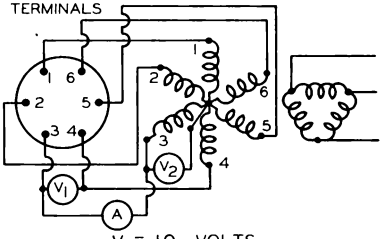


FOR CONNECTIONS OF FILAMENT TERMINALS SEE DRAWING FILAMENT CONNECTIONS AND EXCITATION CIRCUITS

F = FILAMENT
P = PLATE
G = GRID

893-A

FILAMENT CONNECTIONS AND EXCITATION CIRCUITS

D-C FILAMENT EXCITATION	FILAMENT BASE TERMINALS  V = 20 VOLTS A = 183 AMP.
SINGLE-PHASE A-C FILAMENT EXCITATION	FILAMENT BASE TERMINALS  V = 20 VOLTS A = 183 AMP.
THREE-PHASE A-C FILAMENT EXCITATION	FILAMENT BASE TERMINALS  V = 17.3 VOLTS A = 122 AMP.
SIX-PHASE A-C FILAMENT EXCITATION NOTE: TERMINALS MUST BE CONNECTED IN CORRECT PHASE RELATION AS SHOWN	FILAMENT BASE TERMINALS  V_1 = 10 VOLTS V_2 = 10 VOLTS A = 61 AMP.

893A-R

TRANSMITTING TRIODE
FORCED-AIR COOLED

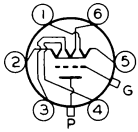
GENERAL DATA

Electrical:

Filament: Tungsten, Three-Section Type
Excitation . . 1φAC, 3φAC, 6φAC, or DC
Voltage per strand . . . . 10 . . . . . volts
Current per terminal . . . 61 . . . . . amp.
(See FILAMENT CONNECTIONS AND EXCITATION CIRCUITS under type 893-A)
Starting – The current per terminal must never exceed 120 amperes, even momentarily.
Amplification Factor 36
Direct Interelectrode Capacitances (Approx.):
Grid to Plate. . . . . 34 . . . . . μμf
Grid to Filament . . . . . 48 . . . . . μμf
Plate to Filament. . . . . 3.5 . . . . . μμf

Physical:

Terminal Connections:
Term. 1 – Fil. No. 3
Term. 2 – Fil. No. 2
Term. 3 – Fil. No. 1
Term. 4 – Fil. No. 2
Term. 5 – Fil. No. 3
Term. 6 – Fil. No. 1



TERMINAL No5 IS ABOVE GRID ARM

G – Grid Cap Terminal

P – Radiator-cooled Plate Terminal

Mounting Position. . . . . Vertical only, glass end up
Overall Length . . . . . 26-7/8" ± 1-1/8"
Greatest Radius. . . . . 8-13/16"
Cap. . . . . No. 3935
Base (with nozzle for air-cooling of filament seal) No. 6628
Radiator . . . . . Integral part of tube
Cooling – A vertical air flow of at least 1800 cu. ft./min. should be delivered by a blower to the cooling radiator. An air flow of about 2 cu. ft./min. should be supplied to the air nozzle in the filament base. Cooling must be adequate to limit the glass temperature to not more than 150°C at the hottest part. Air flow must start before the application of any voltages. The incoming air temperature must not exceed 45°C.

This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in General Section.

A-F POWER AMPLIFIER & MODULATOR – Class B

Maximum Ratings, ***Absolute Values:***

D-C PLATE VOLTAGE	20000 max.	volts
MAX.-SIGNAL D-C PLATE CURRENT*	4 max.	amp.
MAX.-SIGNAL PLATE INPUT*	60 max.	kw
PLATE DISSIPATION*	20 max.	kw
RADIATOR TEMPERATURE▲	180 max.	°C

* Averaged over any audio-frequency cycle of sine-wave form.
▲ : See next page.

893A-R

TRANSMITTING TRIODE

(continued from preceding page)

Typical Operation:

Unless otherwise specified. values are for 2 tubes

D-C Plate Voltage	12000	15000	18000	. . .	volts
D-C Grid Voltage.	-260	-350	-450	. . .	volts
Peak A-F Grid-to-Grid Voltage	1480	1560	1720	. . .	volts
Zero-Sig. D-C Plate Cur. .	0.8	0.8	0.8	. . .	amp.
Max.-Sig. D-C Plate Cur. .	7.0	6.0	5.5	. . .	amp.
Effective Load Res. (plate-to-plate). . . .	4000	6000	8000	. . .	ohms
Max.-Sig. Driving Power .	220	190	140		approx. watts
Max.-Sig. Power Output. .	52	60	70		approx. kw

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

D-C PLATE VOLTAGE	20000	max. .	volts
D-C PLATE CURRENT	2	max. .	amp.
PLATE INPUT	32	max. . .	kw
PLATE DISSIPATION	20	max. . .	kw
RADIATOR TEMPERATURE▲	180	max. . .	°C

Typical Operation:

D-C Plate Voltage	12000	15000	15000	. . .	volts
D-C Grid Voltage.	-250	-340	-340	. . .	volts
Peak R-F Grid Voltage . .	350	395	450	. . .	volts
D-C Plate Current	1.5	1.5	2.0	. . .	amp.
Driving Power #**	130	150	200		approx. watts
Power Output #	6	7.5	10		approx. kw

** At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

D-C PLATE VOLTAGE	12000	max. .	volts
D-C GRID VOLTAGE.	-3000	max. .	volts
D-C PLATE CURRENT	2	max. .	amp.
D-C GRID CURRENT.	0.4	max. .	amp.
PLATE INPUT	24	max. . .	kw
PLATE DISSIPATION	12	max. . .	kw
RADIATOR TEMPERATURE▲	180	max. . .	°C

Typical Operation:

D-C Plate Voltage	10000	10000	12000	. . .	volts
D-C Grid Voltage.	-900	-800	-1000	. . .	volts

▲, #: See next page.

893A-R

TRANSMITTING TRIODE

(continued from preceding page)

Peak R-F Grid Voltage . .	1200	1280	1500	. . . volts
D-C Plate Current	1.5	2.0	2.0	. . . amp.
D-C Grid Current #	0.10	0.16	0.14	approx. amp.
Driving Power #	120	210	210	approx. watts
Power Output.	11	15	18	approx. kw

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation##

Maximum Ratings, ***Absolute Values*****:**

D-C PLATE VOLTAGE	20000 max.	. volts
D-C GRID VOLTAGE.	-3000 max.	. volts
D-C PLATE CURRENT	4 max.	. amp.
D-C GRID CURRENT.	0.4 max.	. amp.
PLATE INPUT	70 max.	. . kw
PLATE DISSIPATION	20 max.	. . kw
RADIATOR TEMPERATURE▲	180 max.	. . °C

Typical Operation:

D-C Plate Voltage	12000	15000	18000	. . . volts
D-C Grid Voltage.	-800	-900	-1000	. . . volts
Peak R-F Grid Voltage . .	1430	1520	1630	. . . volts
D-C Plate Current	3.5	3.6	3.6	. . . amp.
D-C Grid Current #	0.26	0.25	0.21	approx. amp.
Driving Power #	360	370	340	approx. watts
Power Output.	30	40	50	approx. kw

Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

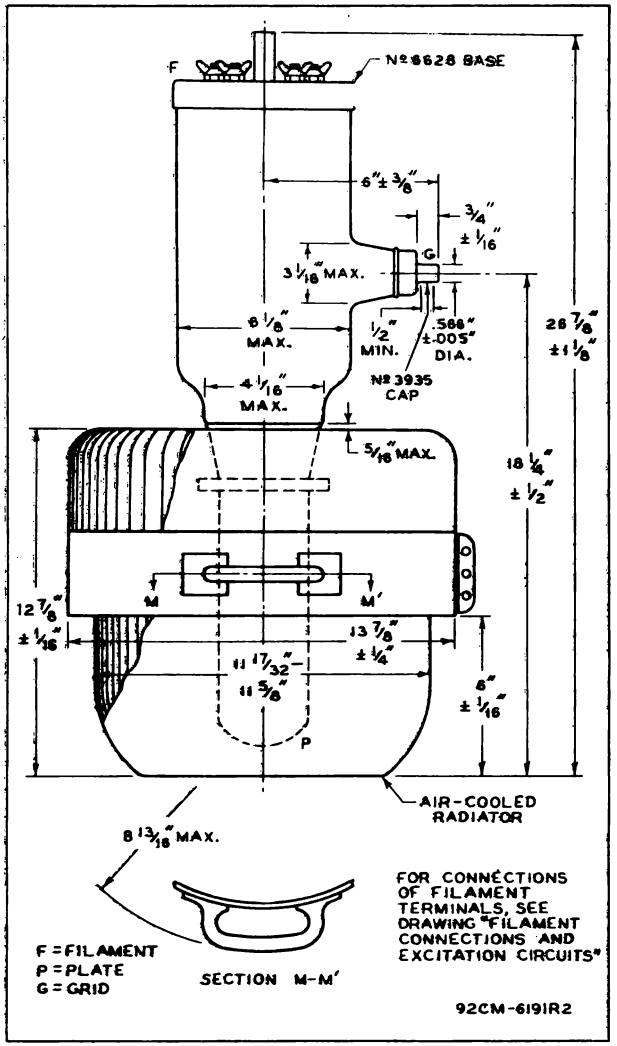
Modulation essentially negative may be used if the positive peak of the audio frequency envelope does not exceed 115% of the carrier conditions.

▲ Measured in thermometer well.

Data on operating frequencies for the 893A-R are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

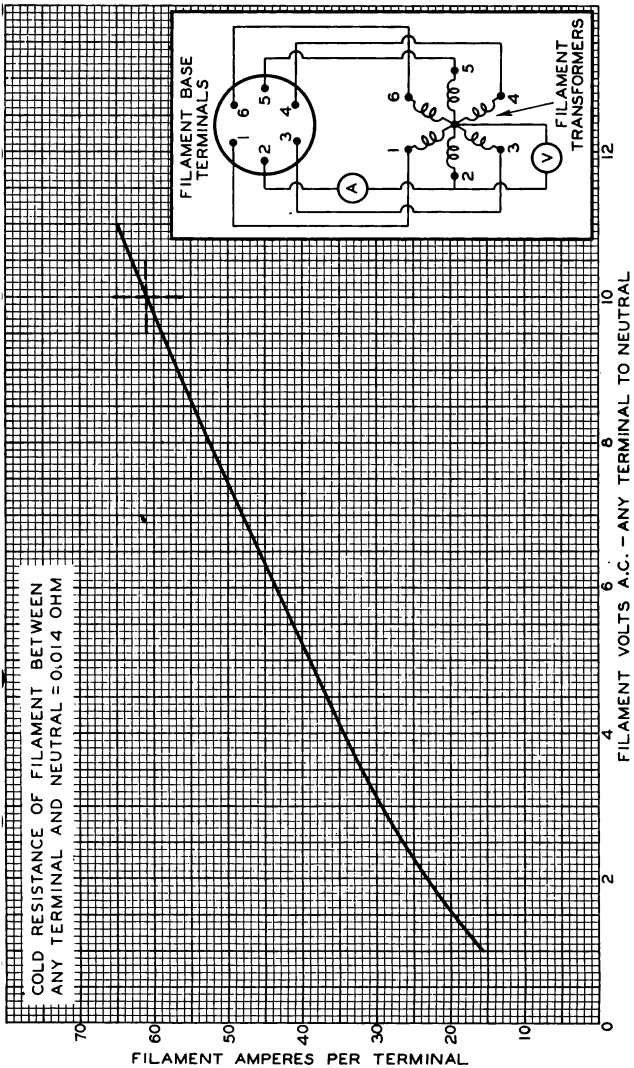
893A-R

TRANSMITTING TRIODE



893A-R

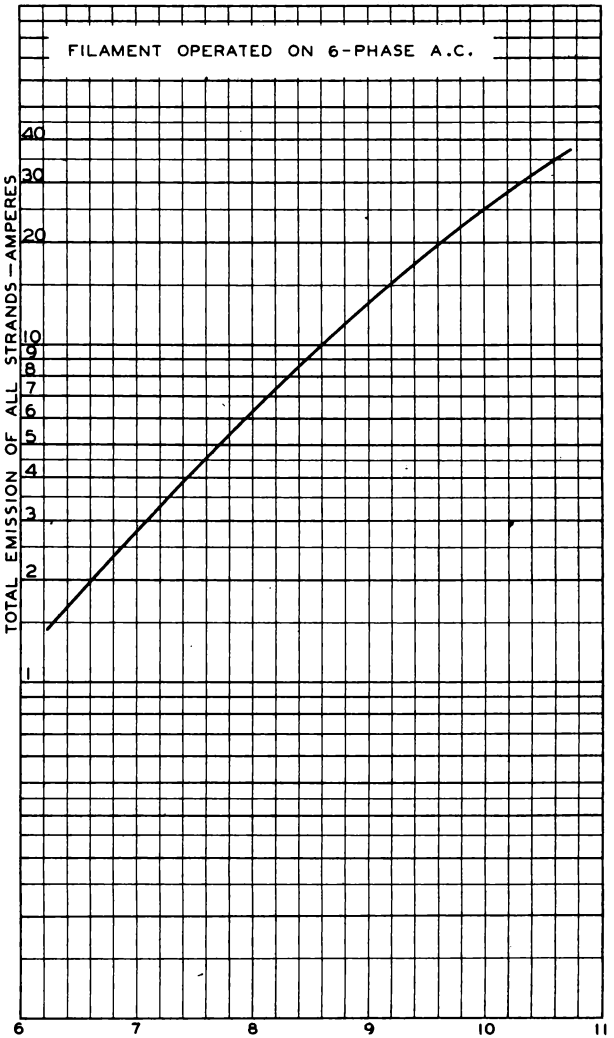
AVERAGE FILAMENT CHARACTERISTIC



893A-R

893A-R

AVERAGE FILAMENT-EMISSION CHARACTERISTIC



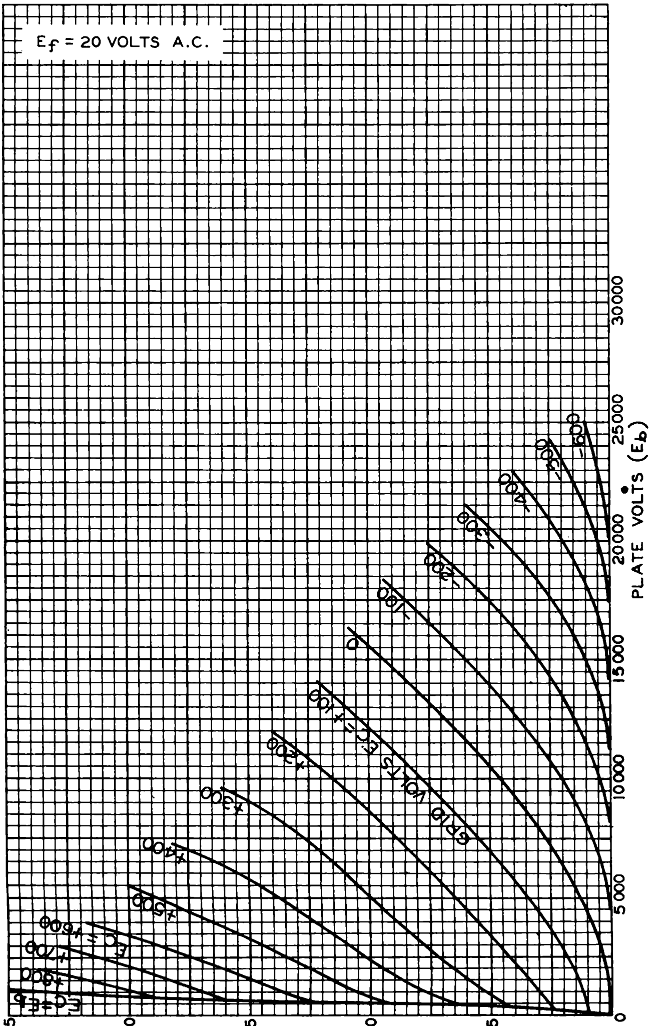
FEB. 10, 1945

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6185R1

893A-R

AVERAGE PLATE CHARACTERISTICS



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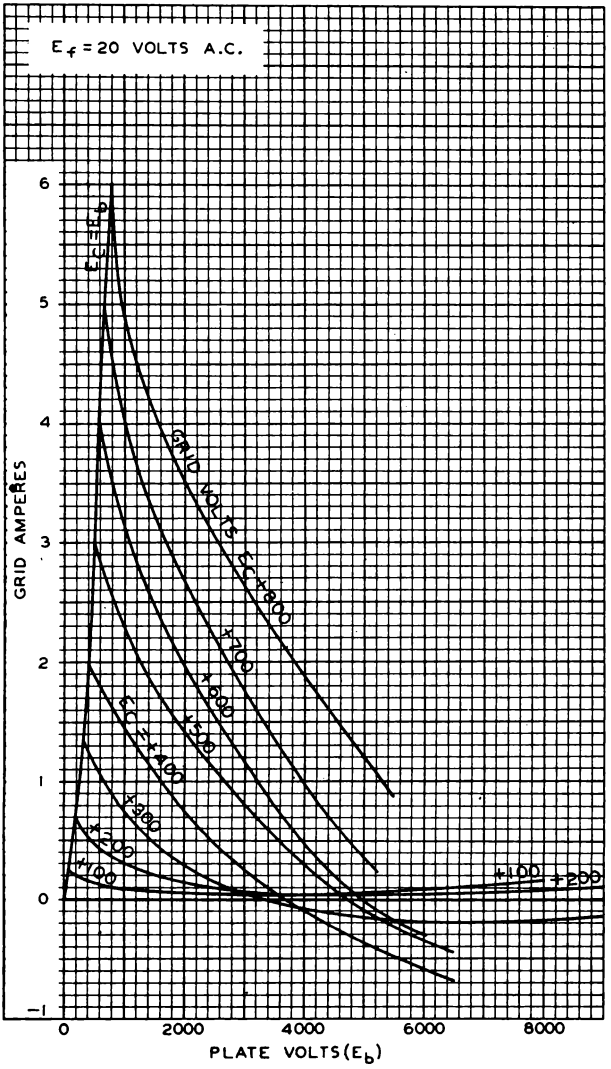
92CM-6186R1

893A-R

TYPICAL CHARACTERISTICS



RCA VICTOR DIVISION
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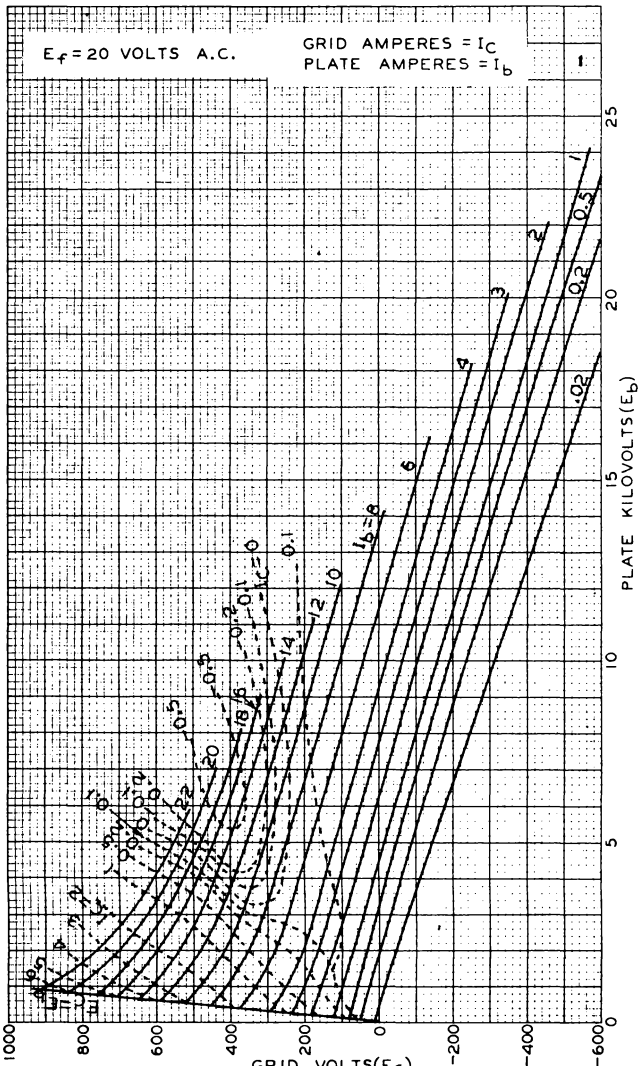
893A-R

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



FEB. 10, 1945

RCA VICTOR DIVISION

92CM-6187R1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

898-A

TRANSMITTING TRIODE

WATER & FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament: Tungsten, Three-Section Type
- Excitation . . . . 1φAC, 3φAC, or DC
- Voltage per section. . . 33 . . . . . volts
- Current per section. . . 70 . . . . . amp.

(See FILAMENT CONNECTIONS AND EXCITATION CIRCUITS under this type)

Starting – The current per section should never exceed 105 amperes, even momentarily.

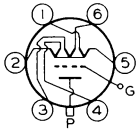
Amplification Factor . . . 45

Direct Interelectrode Capacitances (Approx.):
- Grid to Plate. . . . . 62 . . . . . μμf
- Grid to Filament . . . . 52 . . . . . μμf
- Plate to Filament. . . . 4.2 . . . . . μμf

Mechanical:

Terminal Connections:
- Term. 1 – Fil. No. 3
- Term. 2 – Fil. No. 2
- Term. 3 – Fil. No. 1
- Term. 4 – Fil. No. 2
- Term. 5 – Fil. No. 3
- Term. 6 – Fil. No. 1

TOP VIEW



TERMINAL №5 IS ABOVE GRID ARM

G – Ribbon Grid Terminal

P – Water-cooled Plate Terminal

Mounting Position. . . . . Vertical only, glass end up

Maximum Overall Length . . . . . 60-3/8"

Greatest Radius. . . . . 10"

Base (with nozzle for air-cooling of filament seal) No.6628

Water Jacket (with nozzle for air-cooling of bulb) UT-1289-A

Gasket . . . . . RCA Stock No. 17879

Cooling – *Water flow* of 15 to 25 gallons per minute must start before application of any voltages and continue for at least 10 minutes after removal of all voltages. Water temperature must not exceed 70°C at jacket outlet under any conditions of operation.

Air flow of 15 cubic feet per minute in bulb nozzle and 3 cubic feet per minute in filament-seal nozzle is required before the application of any voltages and must continue for at least 10 minutes after removal of voltages to limit the glass temperature to 150°C at the hottest part. The incoming air temperature must not exceed 50°C.

This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in General Section.

A-F POWER AMPLIFIER & MODULATOR – Class B

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	15000 max.	volts
MAX.-SIGNAL D-C PLATE CURRENT*.	7.5 max.	amp.
MAX.-SIGNAL PLATE INPUT*.	100 max.	kw
PLATE DISSIPATION*.	50 max.	kw

* Averaged over any audio-frequency cycle of sine-wave form.

898-A

TRANSMITTING TRIODE

(continued from preceding page)

Typical Operation:

Unless otherwise specified, values are for 2 tubes

D-C Plate Voltage	12000	volts
D-C Grid Voltage●	-100	volts
Peak A-F Grid-to-Grid Voltage	2200	volts
Zero-Sig. D-C Plate Current	2	amp.
Max.-Sig. D-C Plate Current	13	amp.
Effective Load Res. (plate-to-plate)	2000	ohms
Max.-Sig. Driving Power	6	approx. kw
Max.-Sig. Power Output	90	approx. kw

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

D-C PLATE VOLTAGE	20000 max.	volts
D-C PLATE CURRENT	5 max.	amp.
PLATE INPUT	100 max.	kw
PLATE DISSIPATION	75 max.	kw

Typical Operation:

D-C Plate Voltage	12000	15000	18000	volts
D-C Grid Voltage●	-100	-175	-250	volts
Peak R-F Grid Voltage	525	650	775	volts
D-C Plate Current	2.8	3.5	4.2	amp.
Driving Power # **	0.5	0.75	1.1	approx. kw
Power Output	11	17.5	25	approx. kw

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

D-C PLATE VOLTAGE	12000 max.	volts
D-C GRID VOLTAGE	-3000 max.	volts
D-C PLATE CURRENT	5 max.	amp.
D-C GRID CURRENT	1.25 max.	amp.
PLATE INPUT	60 max.	kw
PLATE DISSIPATION	50 max.	kw

Typical Operation:

D-C Plate Voltage	12000	volts
D-C Grid Voltage	-800	volts
Peak R-F Grid Voltage	2000	volts
D-C Plate Current	5	amp.
D-C Grid Current #	1	approx. amp.
Driving Power #	2	approx. kw
Power Output	45	approx. kw

●; **; #; See next page.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

898-A

TRANSMITTING TRIODE

(continued from preceding page)

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

*Key-down conditions per tube without modulation***

Maximum Ratings, ***Absolute Values:***

D-C PLATE VOLTAGE	20000 max.	volts
D-C GRID VOLTAGE	-3000 max.	volts
D-C PLATE CURRENT	10 max.	amp.
D-C GRID CURRENT	1 max.	amp.
PLATE INPUT	200 max.	kw
PLATE DISSIPATION	100 max.	kw

Typical Operation:

D-C Plate Voltage	12000	15000	18000	volts
D-C Grid Voltage	-800	-900	-1000	volts
Peak R-F Grid Voltage	2050	2300	2550	volts
D-C Plate Current	6.25	7.5	8.33	amp.
D-C Grid Current #	0.8	0.85	0.9	approx. amp.
Driving Power #	1.6	2.0	2.4	approx. kw
Power Output	50	75	100	approx. kw

● With a-c filament excitation.

** At crest of a-f cycle with modulation factor of 1.0.

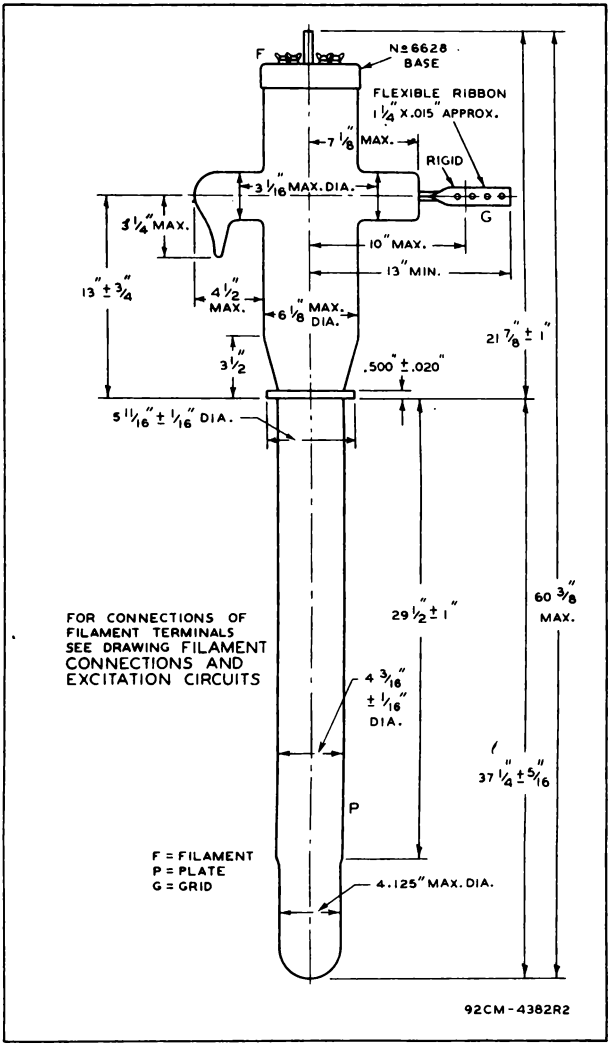
Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

Data on operating frequencies for the 898-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

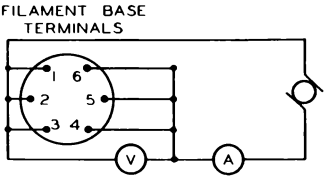
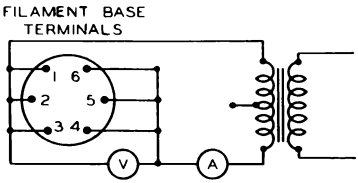
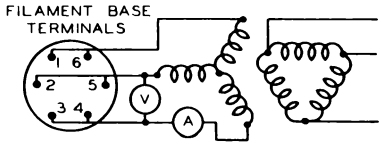
898-A

TRANSMITTING TRIODE



898-A

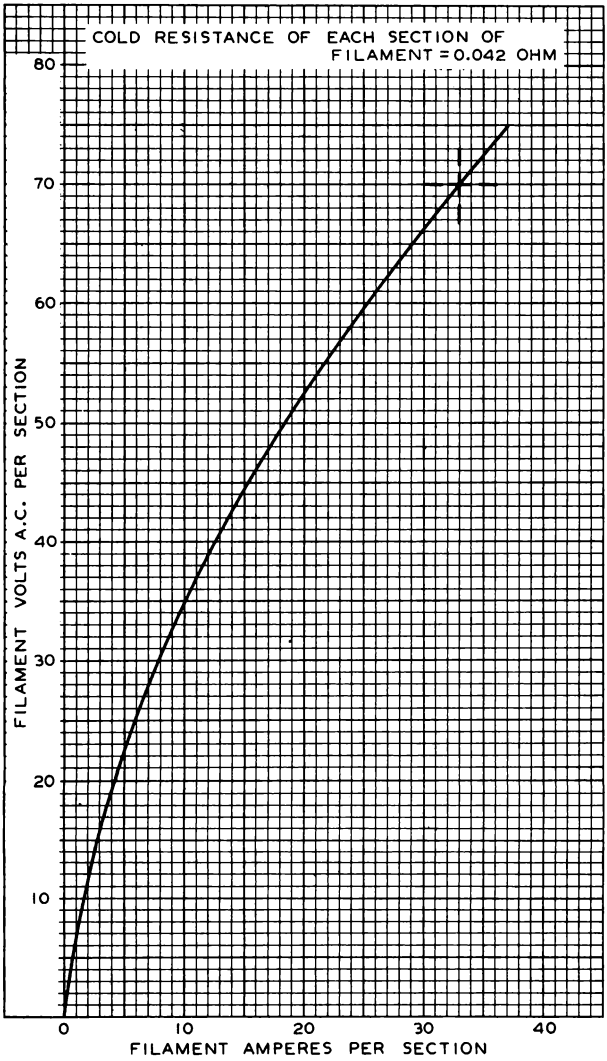
FILAMENT CONNECTIONS AND EXCITATION CIRCUITS

D-C FILAMENT EXCITATION	 V = 33 VOLTS A = 210 AMP.
SINGLE-PHASE A-C FILAMENT EXCITATION	 V = 33 VOLTS A = 210 AMP.
THREE-PHASE A-C FILAMENT EXCITATION	 V = 28.6 VOLTS A = 140 AMP.

898-A

898-A

AVERAGE FILAMENT CHARACTERISTIC



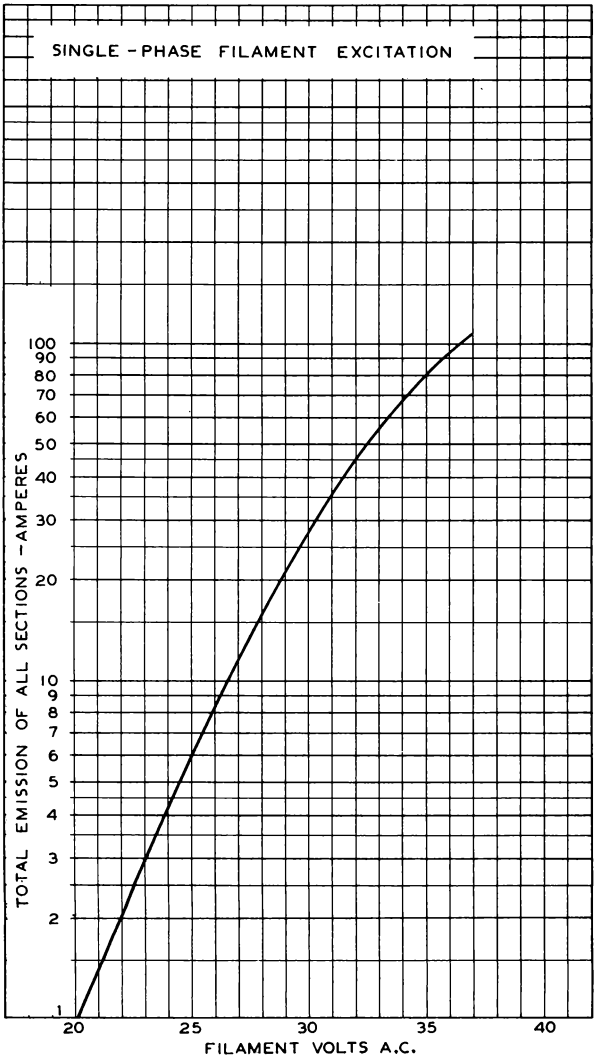
FEB. 3, 1945

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM—4389R2

898-A

AVERAGE FILAMENT-EMISSION CHARACTERISTIC



FEB. 8, 1945

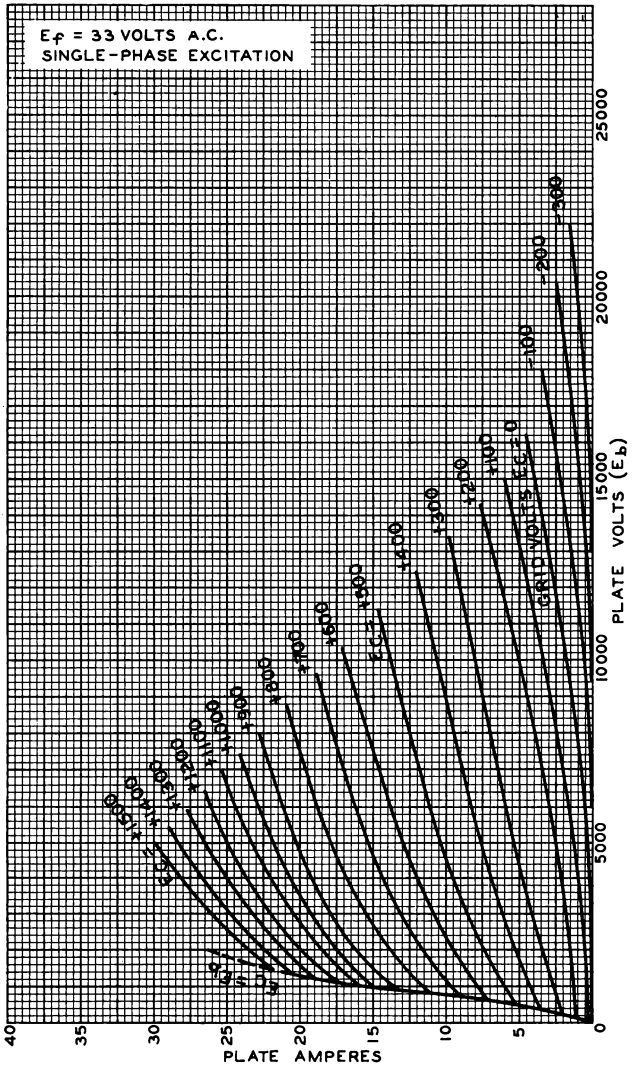
RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-4390R3

898-A

898-A

AVERAGE PLATE CHARACTERISTICS



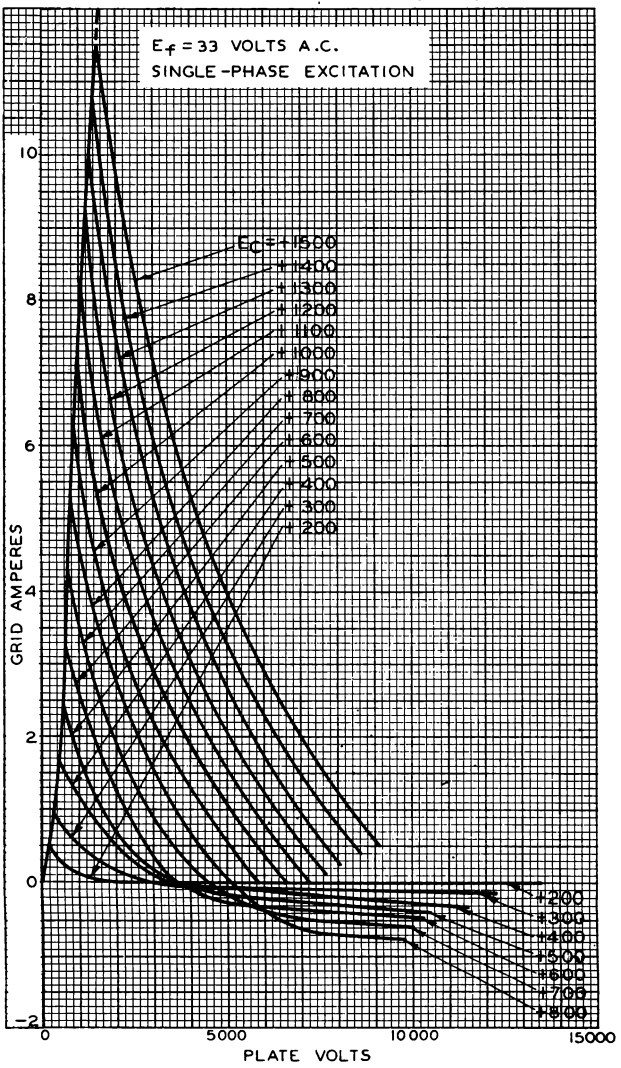
FEB. 7, 1945

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-4383R2

898-A

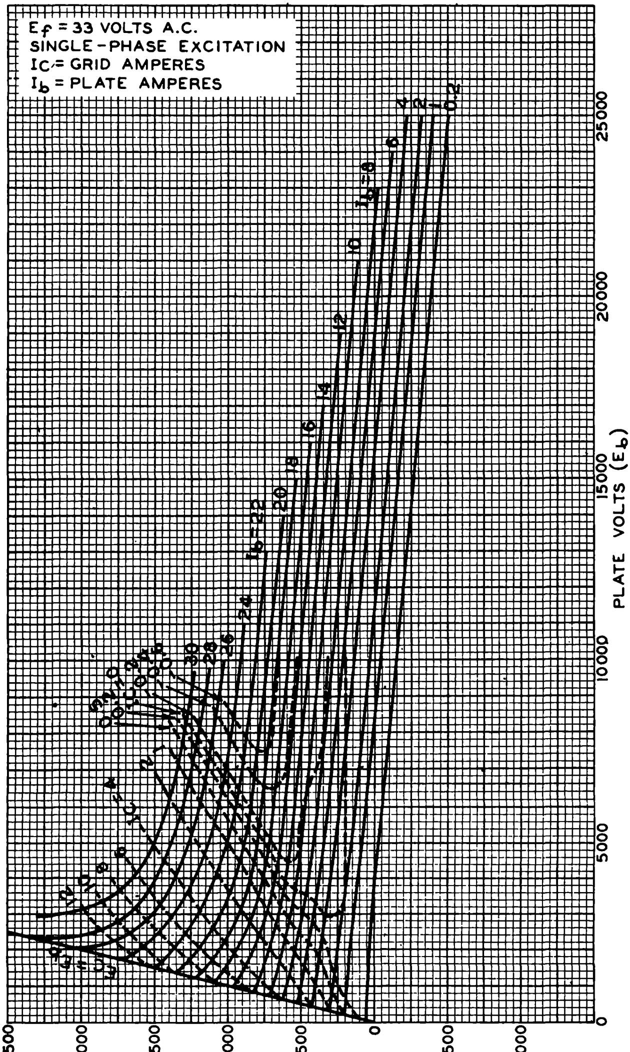
TYPICAL CHARACTERISTICS



898-A

898-A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



FEB. 7, 1945

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6069R2

1608
R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

Filament	Coated	
Voltage	2.5	a-c or d-c volts
Current	2.5	amp.
Amplification Factor	20	
Direct Interelectrode Capacitances:		
Grid to Plate	9	μμf
Grid to Filament	8.5	μμf
Plate to Filament	3	μμf
Maximum Overall Length		5-3/8" ←
Maximum Diameter		2-1/16" ←
Bulb		ST-16
Base		Medium 4-Pin Ceramic, Bayonet
RCA Socket		Type UR-542-A ←

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage		425 max.	volts
Max.-Signal D-C Plate Current *		95 max.	ma.
Max.-Signal Plate Input *		40 max.	watts
Plate Dissipation *		20 max.	watts
Typical Operation:			
Unless otherwise specified, values are for 2 tubes			
D-C Plate Voltage	350	425	volts
D-C Grid Voltage	-10	-15	volts
Peak A-F Grid-to-Grid Voltage	120	130	volts ←
Zero-Signal D-C Plate Cur.	30	36	ma.
Max.-Signal D-C Plate Cur.	190	190	ma.
Load Resistance (per tube)	950	1200	ohms
Effective Load Res. (plate to plate)	3800	4800	ohms
Max.-Signal Driving Power	2.2	2.2	approx.watts
Max.-Signal Power Output	38	50	approx.watts

* Averaged over any audio-frequency cycle of sine-wave form.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		425 max.	volts
D-C Plate Current		70 max.	ma.
Plate Input		30 max.	watts
Plate Dissipation		20 max.	Watts
Typical Operation:			
D-C Plate Voltage	350	425	volts
D-C Grid Voltage	-10	-15	volts
Peak R-F Grid Voltage	35	40	volts
D-C Plate Current	70	70	ma.
D-C Grid Current **	4	4	approx.ma.
Driving Power ** o	2	2	approx.watts
Power Output	7	10	approx.watts

** See next page.
o At crest of a-f cycle with modulation factor of 1.0.
← indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

1608
R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		350 max.	volts
D-C Grid Voltage		-200 max.	volts
D-C Plate Current		85 max.	ma.
D-C Grid Current		25 max.	ma.
Plate Input		30 max.	watts
Plate Dissipation		13.5 max.	watts
Typical Operation:			
D-C Plate Voltage	325	350	volts
→ D-C Grid Voltage ¶	4000	4000	ohms
	-80	-80	volts
Peak R-F Grid Voltage	150	165	volts
D-C Plate Current	85	85	ma.
D-C Grid Current **	20	20	approx.ma.
Driving Power **	2.7	3	approx.watts
Power Output	16	18	approx.watts

¶ Obtained by grid-leak resistor or partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation

D-C Plate Voltage		425 max.	volts
D-C Grid Voltage		-200 max.	volts
D-C Plate Current		95 max.	ma.
D-C Grid Current		25 max.	ma.
Plate Input		40 max.	watts
Plate Dissipation		20 max.	watts
Typical Operation:			
D-C Plate Voltage	350	425	volts
→ D-C Grid Voltage△	4300	4500	ohms
	-85	-90	volts
Peak R-F Grid Voltage	150	155	volts
D-C Plate Current	95	95	ma.
D-C Grid Current **	20	20	approx.ma.
Driving Power **	3	3	approx.watts
Power Output	20	27	approx.watts

△ Obtained by grid-leak resistor or other self- or fixed-bias method.

* Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

** Subject to considerable variation as explained on sheet TRANS. TUBE RATINGS.

For use of the 1608 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

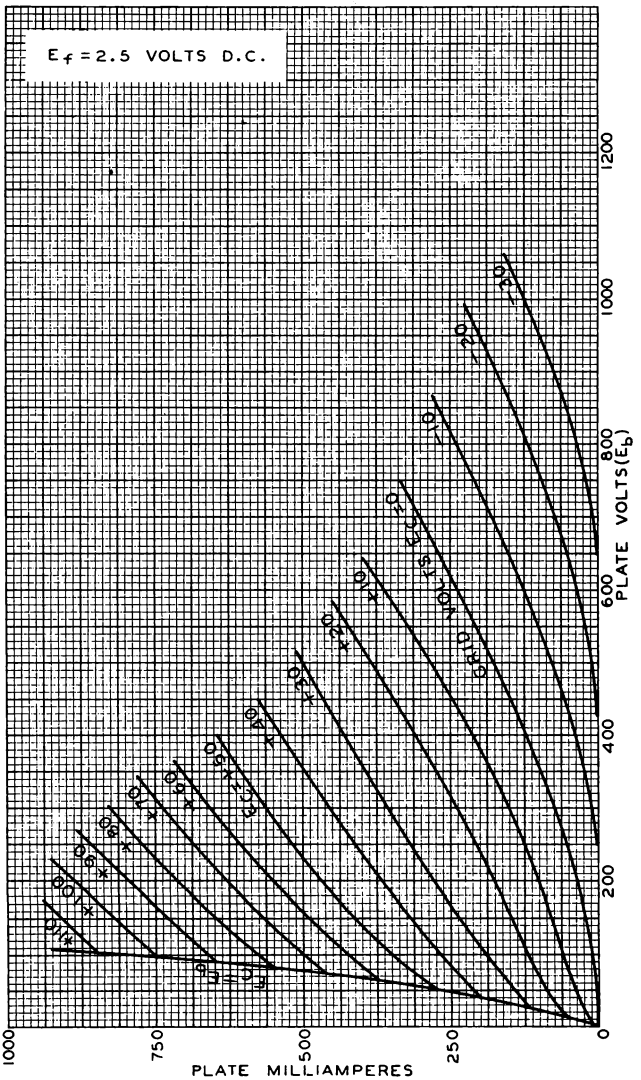
OUTLINE DIMENSIONS, TUBE SYMBOL, and SOCKET CONNECTIONS for the 1608 are the same as for the 801.

← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

1608

AVERAGE PLATE CHARACTERISTICS



FEB. 4, 1937

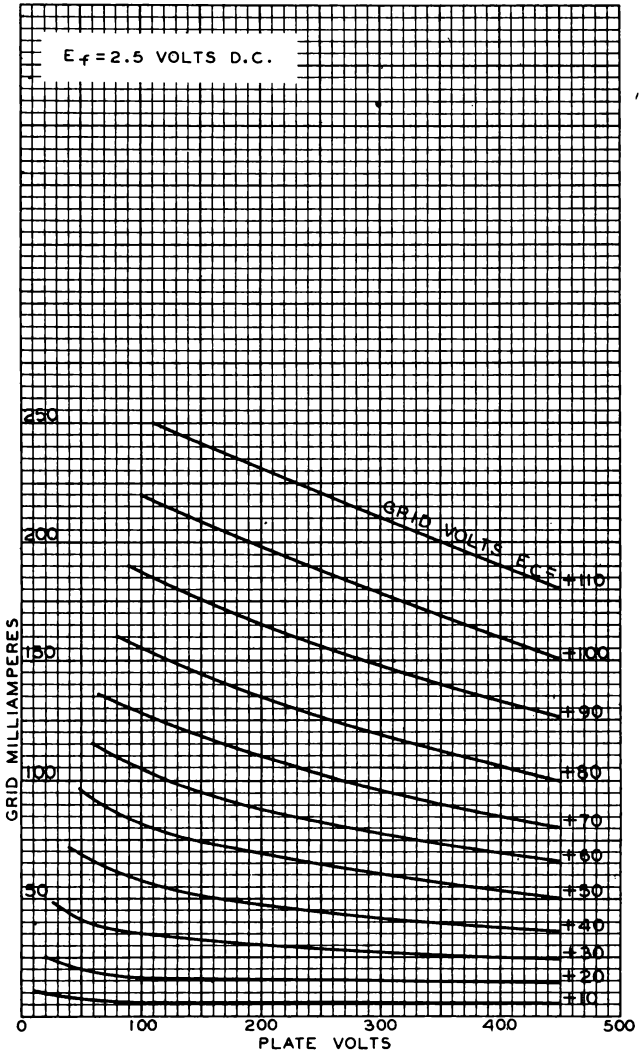
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4729

1608

1608

AVERAGE CHARACTERISTICS



FEB. 5, 1937

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4730

1610

CRYSTAL-OSCILLATOR PENTODE

Filament	Coated	
Voltage	2.5	a-c or d-c volts
Current	1.75	amp
Transconductance for plate current of 31 ma.	2500	µmhos
Direct Interelectrode Capacitances:		
Grid to Plate	1.2	µµf
Input	8.6	µµf
Output	13	µµf
Maximum Overall Length		5-3/8"
Maximum Diameter		2-1/16"
Bulb		ST-16
Base		Medium 5-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage		400 max.	volts
D-C Screen Voltage (Grid #2)		200 max.	volts
D-C Grid Voltage (Grid #1)		-100 max.	volts
D-C Plate Current		30 max.	ma.
D-C Grid Current		3 max.	ma.
Plate Input		9 max.	watts
Screen Input		2 max.	watts
Plate Dissipation		6 max.	watts
Typical Operation:			
Filament Voltage	2.5	2.5	a-c volts
D-C Plate Voltage	300	400	volts
D-C Screen Voltage	125	150	volts
D-C Grid Voltage	-60▲	-50▲	volts
Peak R-F Grid Voltage	110	75	volts
D-C Plate Current	30	22.5	ma.
D-C Screen Current	13	7	ma.
D-C Grid Current	2.5	1.5	approx.ma.
Driving Power	0.25	0.1	approx.watt
Power Output	5	5	approx.watts

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

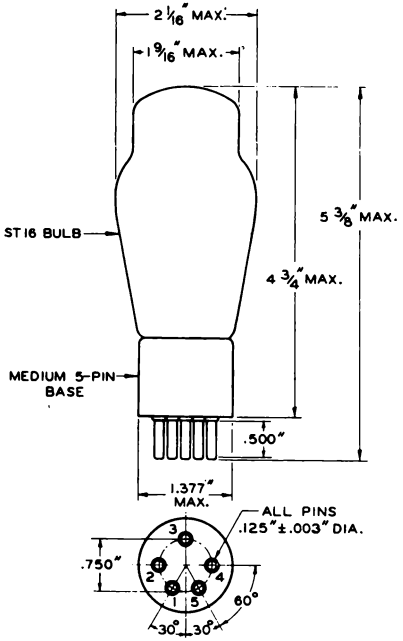
▲ Bias may also be obtained with 30000-ohm grid resistor.

For use of the 1610 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

1610

CRYSTAL-OSCILLATOR PENTODE

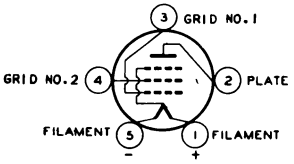
(continued from preceding page)



BOTTOM VIEW OF BASE

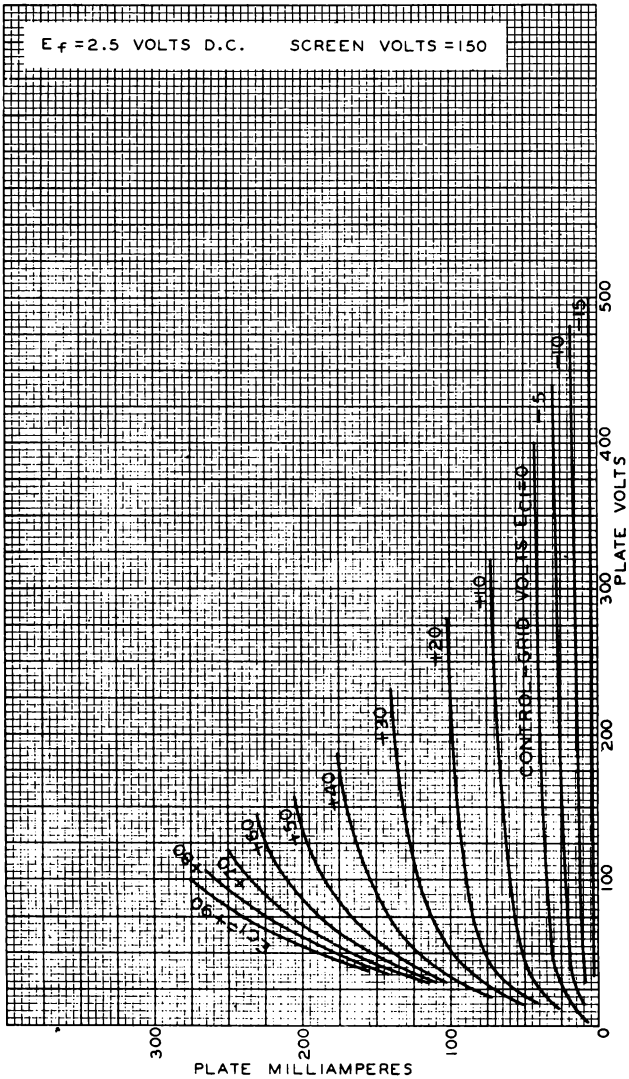
92C-4770

TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



1610

AVERAGE PLATE CHARACTERISTICS



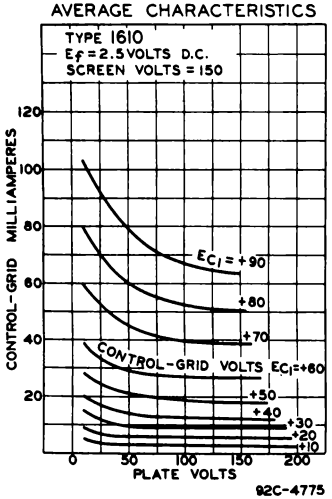
JUNE 8, 1937

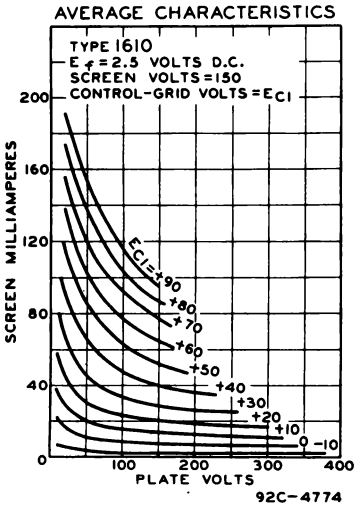
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4773

1610

CRYSTAL-OSCILLATOR PENTODE



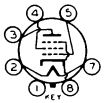


RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

1613

R-F POWER AMPLIFIER PENTODE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.7	amp.
Transconductance for plate current of 31 ma.	2500	μmhos
Direct Interelectrode Capacitances:⊙		
Grid to Plate	0.26	μμf
Input	6.5	μμf
Output	13.5	μμf
Maximum Overall Length		3-1/4"
Maximum Seated Height		2-11/16" ←
Maximum Diameter		1-5/16"
Bulb		Metal Shell, MT-8
Base		Small Wafer Octal 7-Pin
Pin 1 - Shell		Pin 5 - Grid
Pin 2 - Heater		Pin 7 - Heater
Pin 3 - Plate		Pin 8 - Cathode, Suppressor
Pin 4 - Screen		
Mounting Position		Any



BOTTOM-VIEW (7S)

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage	275 max.	volts
D-C Screen Voltage	275 max.	volts
D-C Grid Voltage	-100 max.	volts
D-C Plate Current	50 max.	ma.
D-C Grid Current	5 max.	ma.
Plate Input	11.5 max.	watts
Screen Input	2 max.	watts
Plate Dissipation	7 max.	watts
D-C Heater-Cathode Potential	100 max.	volts
Typical Operation:		
D-C Plate Voltage	275	volts
D-C Screen Voltage△	200	volts
	7500	ohms
D-C Grid Voltage□	-35	volts
	12500	ohms
Peak R-F Grid Voltage	65	volts
D-C Plate Current	42	ma.
D-C Screen Current	10	ma.
D-C Grid Current	2.8 approx.	ma.
Driving Power	0.16 approx.	watt
Power Output	6 approx.	watts

□ Obtained by grid resistor or by partial self-bias methods.
△ Preferably obtained from a separate source modulated with the plate supply, or obtained from the modulated plate-voltage supply through resistor of value shown.
⊙ With shell connected to cathode.

← Indicates a change.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

1613

R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage	350	max.	volts
D-C Screen Voltage	275	max.	volts
D-C Grid Voltage	-100	max.	volts
D-C Plate Current	50	max.	ma.
D-C Grid Current	5	max.	ma.
Plate Input	17.5	max.	watts
Screen Input	2.5	max.	watts
Plate Dissipation	10	max.	watts
D-C Heater-Cathode Potential	100	max.	volts
→ Typical Operation:			
D-C Plate Voltage	350		volts
D-C Screen Voltage■	200		volts
	15000		ohms
D-C Grid Voltage▲	-35		volts
	10000		ohms
Peak R-F Grid Voltage	70		volts
D-C Plate Current	50		ma.
D-C Screen Current	10		ma.
D-C Grid Current	3.5	approx.	ma.
Driving Power	0.22	approx.	watt
Power Output	9	approx.	watts

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.
▲ Obtained by grid resistor or other self- or fixed-bias method.
■ Obtained from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown.

Data on operating frequencies for the 1613 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

→ Indicates a change.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

1614
TRANSMITTING BEAM POWER AMPLIFIER

GENERAL DATA

Electrical:

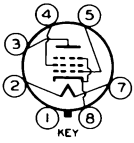
Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.9	amp
Transconductance: for plate current of 72 ma.	6050	μmhos
Direct Interelectrode Capacitances:°		
Grid-No.1 to Plate	0.4 max.	μμf
Input	10	μμf
Output	12	μμf

° with shell connected to cathode.

Mechanical:

Mounting Position	Any
Maximum Overall Length	4-5/16"
Maximum Seated Length	3-3/4"
Maximum Diameter	1-9/16" ± 1/16"
Bulb	MT-10A
Base	Small-Wafer Octal 7-Pin
Basing Designation for BOTTOM VIEW	7AC

Pin 1 - Shell
Pin 2 - Heater
Pin 3 - Plate
Pin 4 - Grid No.2



Pin 5 - Grid No.1
Pin 7 - Heater
Pin 8 - Cathode, Grid No.3

AF POWER AMPLIFIER & MODULATOR - Class AB_1✠ ←

Maximum Ratings, *Absolute Values*:

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	375 max.	550 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	300 max.	400 max.	volts
DC PLATE CURRENT	110 max.	110 max.	ma.
PLATE INPUT	40 max.	60 max.	watts
GRID-No.2 DISSIPATION	3.5 max.	3.5 max.	watts
PLATE DISSIPATION	21 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200 max.	200 max.	volts
Heater positive with respect to cathode	200 max.	200 max.	volts

Typical Operation:
Unless otherwise specified, values are for 2 tubes

DC Plate Voltage	360	530	volts
DC Grid-No.2 Voltage	270	340	volts

✠,●,●●: See next page. ← Indicates a change.

1614
TRANSMITTING BEAM POWER AMPLIFIER

DC Grid-No.1 (Control-Grid) Voltage	-22.5	-36	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	45	72	volts
Zero-Signal DC Plate Current	88	60	ma.
Max.-Signal DC Plate Current	132	160	ma.
Max.-Signal DC Grid-No.2 Current	15	20	ma.
Effective Load Resistance (plate-to-plate)	6600	7200	ohms
Total Harmonic Distortion	2	2.5	%
Max.-Signal Power Output	26.5	50	watts

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

→ **Maximum Ratings,** ***Absolute Values:***

	CCS●	ICAS●●	
DC PLATE VOLTAGE	325 max.	375 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	300 max.	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-125 max.	-125 max.	volts
DC PLATE CURRENT	70 max.	95 max.	ma.
DC GRID-No.1 Current	5 max.	5 max.	ma.
PLATE INPUT	23 max.	35 max.	watts
GRID-No.2 INPUT	2.5 max.	2.5 max.	watts
PLATE DISSIPATION	14 max.	21 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200 max.	200 max.	volts
Heater positive with respect to cathode	200 max.	200 max.	volts

→ **Typical Operation:**

DC Plate Voltage	325	375	volts
DC Grid-No.2 Voltage▲	245	250	volts
	10000	18000	ohms
DC Grid-No.1 Voltage□	-40	-50	volts
	20000	25000	ohms
Peak RF Grid-No.1 Voltage	51	80	volts
DC Plate Current	70	93	ma.
DC Grid-No.2 Current	8	7	ma.
DC Grid-No.1 Current (Approx.)	2	2	ma.
Driving Power (Approx.)	0.1	0.15	watts
Power Output (Approx.)	15	24.5	watts

▲ obtained preferably from a separate source modulated with the plate supply, or from the modulated plate-supply through a series resistor of the value shown.

● Subscript 1 indicates that grid-current does not flow during any part of input cycle.

● ●● □ See next page. ← Indicates a change.

1614
TRANSMITTING BEAM POWER AMPLIFIER

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Triode Connection - Grid No. 2 Connected to Plate

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:* ←

	CCS●	ICAS●●	
DC PLATE VOLTAGE	325 max.	375 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-125 max.	-125 max.	volts
DC PLATE CURRENT	70 max.	95 max.	ma.
DC GRID-No.1 CURRENT	10 max.	10 max.	ma.
PLATE INPUT	23 max.	35 max.	watts
PLATE DISSIPATION	14 max.	21 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200 max.	200 max.	volts
Heater positive with respect to cathode	200 max.	200 max.	volts

Typical Operation: ←

DC Plate Voltage	325	375	volts
DC Grid-No.1 Voltage□	-85	-90	volts
	21000	15000	ohms
Peak RF Grid-No.1 Voltage	102	135	volts
DC Plate Current	65	90	ma.
DC Grid-No.1 Current (Approx.)	4	6	ma.
Driving Power (Approx.)	0.4	0.8	watts
Power Output (Approx.)	11.5	21	watts

□ obtained from grid resistor of value shown or by partial self-bias methods.

RF AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum Ratings, *Absolute Values:* ←

	CCS●	ICAS●●	
DC PLATE VOLTAGE	375 max.	450 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	300 max.	300 max.	volts
DC GRID-No.1 (CONTROL GRID) VOLTAGE	-125 max.	-125 max.	volts
DC PLATE CURRENT	110 max.	110 max.	ma.
DC GRID-No.1 CURRENT	5 max.	5 max.	ma.
PLATE INPUT	35 max.	45 max.	watts
GRID-No.2 INPUT	3.5 max.	3.5 max.	watts
PLATE DISSIPATION	21 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200 max.	200 max.	volts
Heater positive with respect to cathode	200 max.	200 max.	volts

●, ●●, □□ : See next page. ← indicates a change.

1614

1614
TRANSMITTING BEAM POWER AMPLIFIER

→ **Typical Operation:**

DC Plate Voltage	375	450	volts
DC Grid-No.2 Voltage⊕	250	250	volts
	12500	25000	ohms
DC Grid-No.1 Voltage⊕⊕	-40	-45	volts
	20000	22500	ohms
	425	410	ohms
Peak RF Grid-No.1 Voltage	51	73	volts
DC Plate Current	80	100	ma.
DC Grid-No.2 Current	10	8	ma.
DC Grid-No.1 Current(Approx.)	2	2	ma.
Driving Power (Approx.)	0.1	0.15	watts
Power Output (Approx.)	21	31	watts

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of carrier conditions.

⊕ obtained from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown.

⊕⊕ obtained from fixed supply, by grid resistor (20000, 22500), by cathode resistor (425, 410) or by combination methods.

Data on operating frequencies for the 1614 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

CURVES under type 807 apply to the 1614 within its maximum ratings

← Indicates a change.

1616

HALF-WAVE HIGH-VACUUM RECTIFIER

Filament	Coated	
Voltage †	2.5	a-c volts
Current	5.0	amp.
Maximum Overall Length		6-13/16" ←
Maximum Diameter		2-1/16"
Bulb		T-16
Cap		Medium Metal
Base		Medium 4-Pin, Bayonet
RCA Socket (UT-542-A)		Stock No. 9937 ←

Maximum Ratings Are Absolute Values

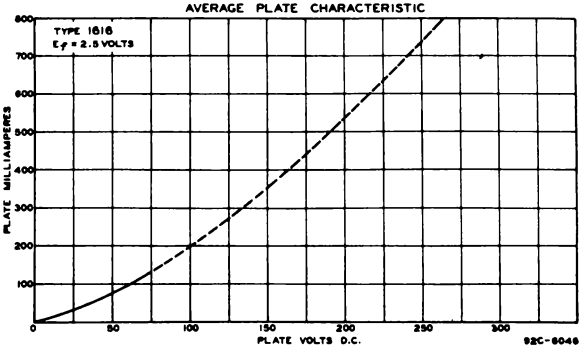
MAXIMUM RATINGS

Peak Inverse Voltage	5500 max.	volts
Peak Plate Current	0.8 max.	amp.
Surge Current	2.5 max.*	amp.
Average Plate Current	0.13 max.	amp.

* Equipment should be designed so that this value is not exceeded during switching operations.

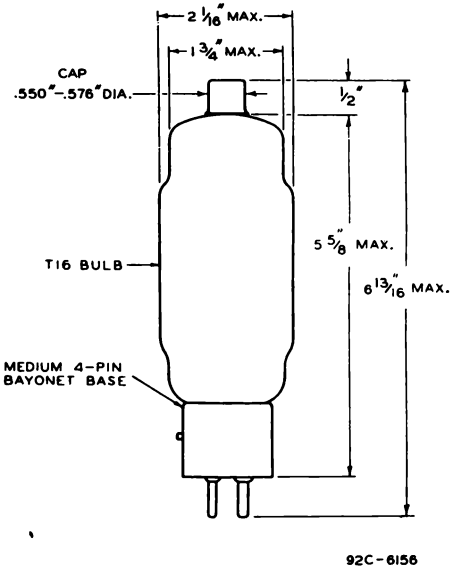
† Should not deviate more than ±5% from the rated value.

AVERAGE PLATE CHARACTERISTIC

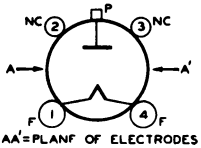


← Indicates a change.

1616
HALF-WAVE HIGH-VACUUM RECTIFIER



BOTTOM VIEW OF SOCKET CONNECTIONS



AA' = PLANE OF ELECTRODES

F - Filament
NC - No Connection
P - Plate

TUBE MOUNTING POSITION

VERTICAL: Base down
HORIZONTAL: Plate in vertical plane (on edge)

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

1619

TRANSMITTING BEAM POWER AMPLIFIER

Filament	Coated	
Voltage	2.5	a-c or d-c volts
Current	2.0	amp.
Transconductance for plate current of 50 ma.	4500 approx.	µmhos
Direct Interelectrode Capacitances:⊙		
Grid to Plate	0.29	µµf
Input	9.6	µµf
Output	12.5	µµf
Maximum Overall Length		4-5/16"
Maximum Diameter		1-9/16"±1/16" ←
Bulb		Metal Shell, MT-10
Base		Small Wafer Octal 7-Pin

Maximum Ratings Are Absolute Values

MAXIMUM CCS RATINGS and TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

SINGLE-TUBE AMPLIFIER - Class A_1

D-C Plate Voltage	400 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	volts
Screen Input	3.5 max.	watts
Plate Dissipation	15 max.	watts
Typical Operation:		
D-C Plate Voltage	300	volts
D-C Suppressor Voltage (Grid #3)**	0	volts
D-C Screen Voltage	250	volts
D-C Grid Voltage (Grid #1) ## °	-10	volts
Peak A-F Grid Voltage	10	volts
Zero-Sig. D-C Plate Current	44	ma.
Max.-Sig. D-C Plate Current	46	ma.
Zero-Sig. D-C Screen Current	4	ma.
Max.-Sig. D-C Screen Current	6	ma.
Load Resistance	8800	ohms
Total Harmonic Distortion	7	%
Max.-Sig. Power Output	3 approx.	watts

The total effective grid-circuit resistance should not exceed 50000 ohms.

PUSH-PULL AMPLIFIER - Class AB_1

D-C Plate Voltage	400 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	volts
Screen Input *	3.5 max.	watts
Plate Dissipation *	15 max.	watts
Typical Operation with Fixed Bias:		
Unless otherwise specified, values are for 2 tubes		
D-C Plate Voltage	400	volts
D-C Suppressor Voltage (Grid #3) **	0	volts
D-C Screen Voltage	300	volts
D-C Grid Voltage (Grid #1) † °	-20	volts
Peak A-F Grid-to-Grid Voltage	40	volts
Zero-Sig. D-C Plate Current	52	ma.

°, *, **, †, ⊙: See end of tabulation. ← Indicates a change.

1619

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

Max.-Sig. D-C Plate Current	80	ma.
Zero-Sig. D-C Screen Current	3.5	ma.
Max.-Sig. D-C Screen Current	10	ma.
Load Resistance (per tube)	3500	ohms
Effective Load Res. (plate to plate)	14000	ohms
Total Harmonic Distortion	3	%
Max.-Sig. Power Output	17.5 approx.	watts

PUSH-PULL AMPLIFIER - Class AB_2

D-C Plate Voltage	400 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	volts
Max.-Sig. D-C Plate Current *	75 max.	ma.
Max.-Sig. Plate Input *	30 max.	watts
Screen Input *	3.5 max.	watts
Plate Dissipation *	15 max.	watts

Typical Operation with Fixed Bias:

Unless otherwise specified, values are for 2 tubes

D-C Plate Voltage	400	volts
D-C Suppressor (Grid #3) **	0	volts
D-C Screen Voltage	300	volts
D-C Grid Voltage (Grid #1) °	-16.5	volts
Peak A-F Grid-to-Grid Voltage □	77	volts
Zero-Sig. D-C Plate Current	75	ma.
Max.-Sig. D-C Plate Current	150	ma.
Zero-Sig. D-C Screen Current	6.5	ma.
Max.-Sig. D-C Screen Current	11.5	ma.
Load Resistance (per tube)	1500	ohms
Effective Load Res. (plate to plate)	6000	ohms
Peak Grid Input Power °°	0.4	watt
Total Harmonic Distortion	2.5	%
Max.-Sig. Power Output ◇	36 approx.	watts

◇ With zero-impedance driver and perfect regulation, plate-circuit distortion does not exceed 2%. In practice, plate-voltage regulation, screen voltage regulation and grid-bias regulation should not be greater than 5%, 5%, and 3% respectively.

□ The driver stage should be capable of supplying the grids of the class AB_2 stage with the specified peak grid voltage at low distortion. The effective resistance per grid circuit should not exceed 500 ohms and the effective impedance at the highest desired response frequency should not exceed 700 ohms.

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier condition per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	400 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	volts
D-C Grid Voltage (Grid #1)	-125 max.	volts
D-C Plate Current	37.5 max.	ma.
Plate Input	15 max.	watts
Screen Input	2.5 max.	watts
Plate Dissipation	15 max.	watts
Typical Operation:		
D-C Plate Voltage	400	volts

*, **, °, °°: See end of tabulation.

1619

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

D-C Suppressor (Grid #3) **	0	volts
D-C Screen Voltage	250	volts
D-C Grid Voltage † ●	-50	volts
	1500	ohms
Peak R-F Grid Voltage	58	volts
Peak A-F Grid Voltage	30	volts
D-C Plate Current	31	ma.
D-C Screen Current	1.5	ma.
D-C Grid Current	1.2	approx.ma.
Driving Power ∞	0.25	approx.watt
Power Output	3.8	approx.watts

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	325 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	volts
D-C Grid Voltage (Grid #1)	-125 max.	volts
D-C Plate Current	62 max.	ma.
D-C Grid Current	5 max.	ma.
Plate Input	20 max.	watts
Screen Input	2.5 max.	watts
Plate Dissipation	10 max.	watts
Typical Operation:		
D-C Plate Voltage	325	volts
D-C Suppressor (Grid #3)**	0	volts
D-C Screen Voltage ♦	285	volts
	5000	ohms
D-C Grid Voltage † □	-50	volts
	18000	ohms
Peak R-F Grid Voltage	70	volts
D-C Plate Current	62	ma.
D-C Screen Current	7.5	ma.
D-C Grid Current	2.8	approx.ma.
Driving Power	0.18	approx.watt
Power Output	13	approx.watts

♦ Preferably obtained from a separate source modulated with the plate supply, or obtained from the modulated plate-voltage supply through resistor of value shown.
□ Obtained by grid resistor of value shown or by partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ■

D-C Plate Voltage	400 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	volts
D-C Grid Voltage (Grid #1)	-125 max.	volts
D-C Plate Current	75 max.	ma.
D-C Grid Current	5 max.	ma.
Plate Input	30 max.	watts
Screen Input	3.5 max.	watts
Plate Dissipation	15 max.	watts

**, ∞, †, ●: See end of tabulation.

1619

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

Typical Operation:

D-C Plate Voltage	400	volts
D-C Suppressor (Grid #3)**	0	volts
D-C Screen Voltage §	300	volts
	9500	ohms
D-C Grid Voltage † *	-55	volts
	11000	ohms
Peak R-F Grid Voltage	80	volts
D-C Plate Current	75	ma.
D-C Screen Current	10.5	ma.
D-C Grid Current	5	approx.ma.
Driving Power	0.36	approx.watt
Power Output	19.5	approx.watts

■ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

o For a-c filament supply. If d.c. is used, the stated voltages should be decreased by 1.75 volts.

† The total effective grid-circuit resistance should not exceed 25000 ohms.

* Averaged over any audio-frequency cycle of sine-wave form.

** Grid No. 3 should be connected to the mid-point of filament operated on a.c., or to negative end of filament when d-c filament supply is used.

∞ At crest of a-f cycle with a modulation factor of 1.0.

● Obtained from fixed supply or by cathode resistor of value shown.

→ § Obtained from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown.

★ The screen voltage must not exceed 600 volts under key-up conditions. Obtained from fixed supply, by grid resistor (11000), or by combination methods. When a preceding stage is keyed, sufficient fixed bias must be used to maintain the plate current at a low value when the key is up.

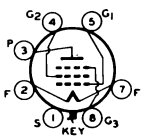
⊙ With shell connected to cathode.

Data on operating frequencies for the 1619 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

TUBE MOUNTING POSITION

VERTICAL: Base up or down.
HORIZONTAL: No.

BOTTOM VIEW OF SOCKET CONNECTIONS

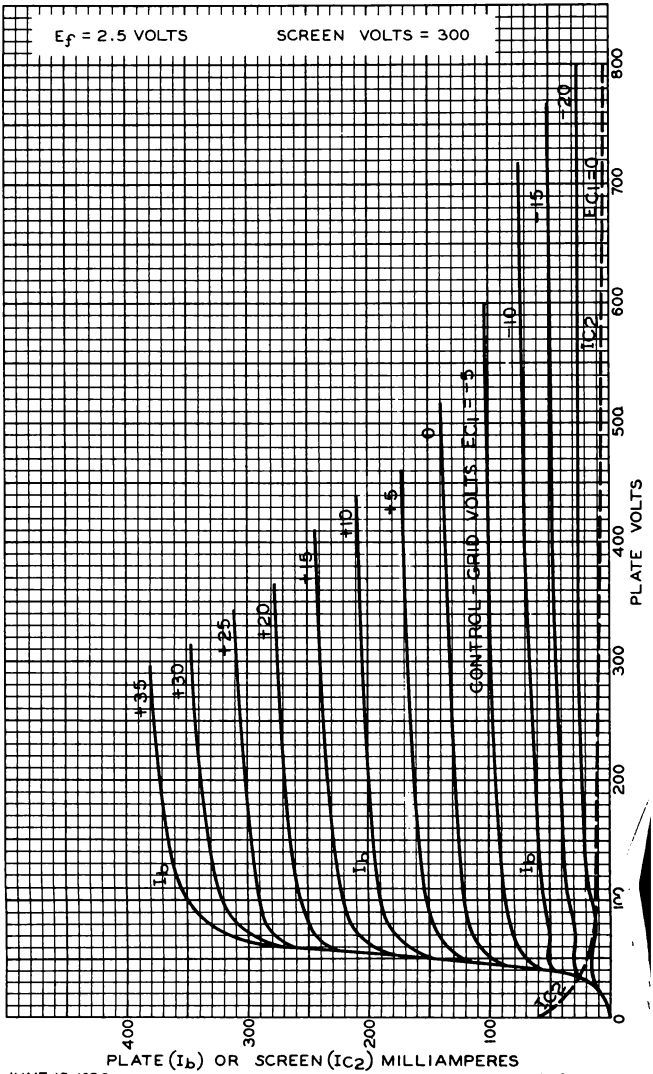


Pin 1 - Shell
Pin 2 - Filament
Pin 3 - Plate
Pin 4 - Grid No. 2
Pin 5 - Grid No. 1
Pin 7 - Filament
Pin 8 - Grid No. 3

← Indicates a change.

1619

1619
AVERAGE PLATE CHARACTERISTICS



JUNE 15, 1938

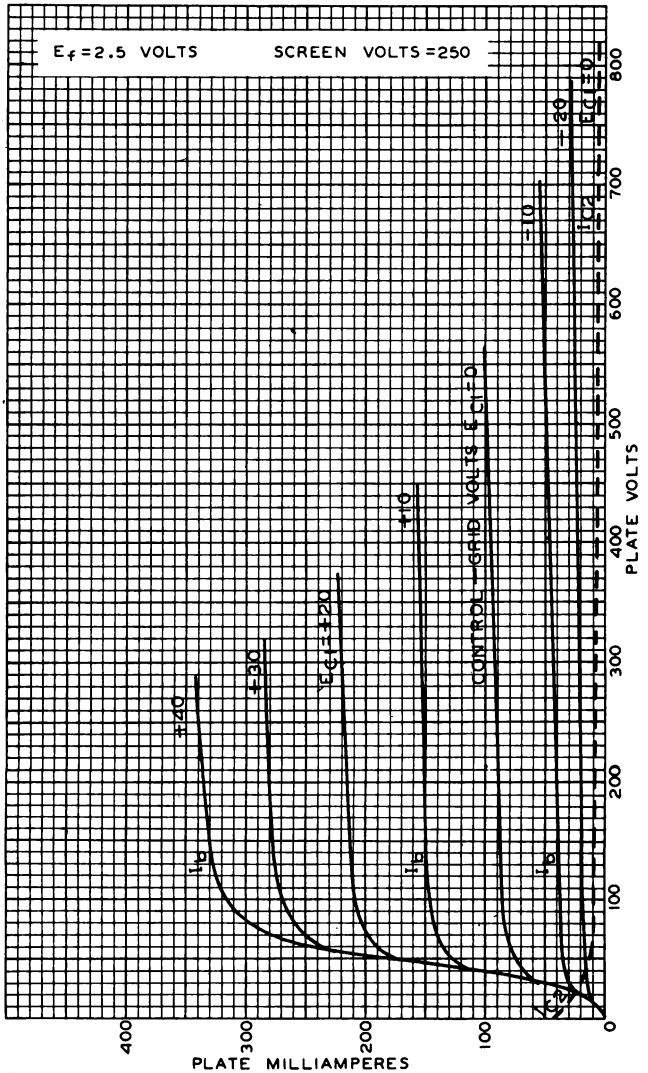
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4931

1619

1619

AVERAGE PLATE CHARACTERISTICS



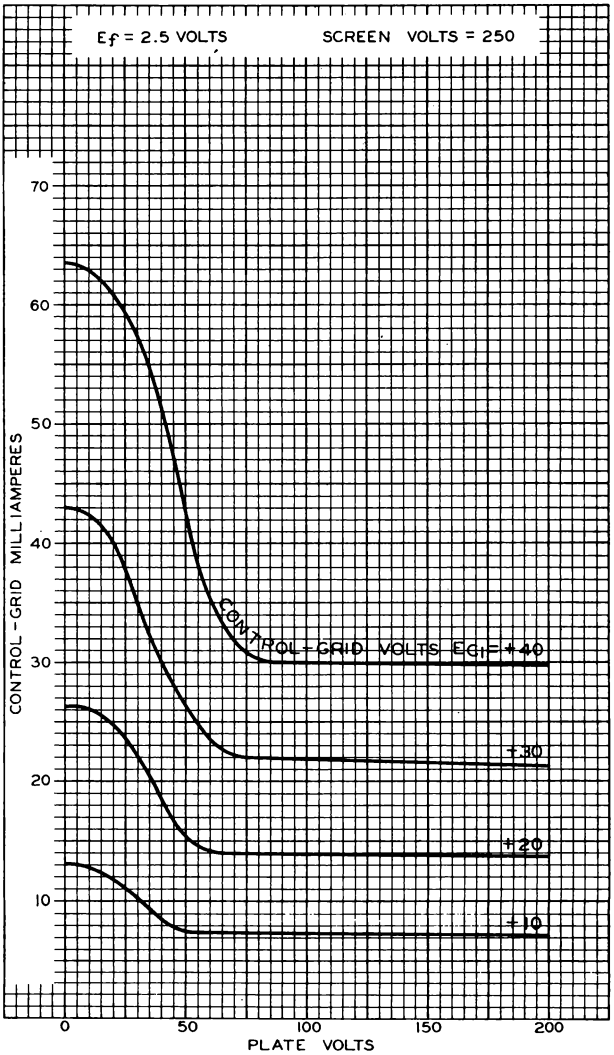
JULY 27, 1938

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4932

1619

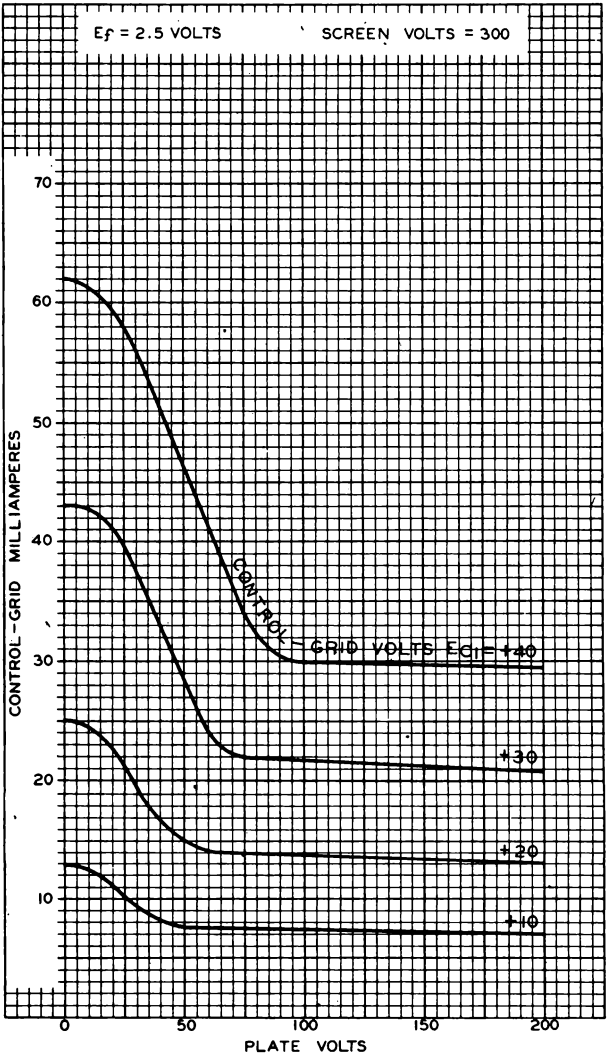
TYPICAL CHARACTERISTICS



1619

1619

TYPICAL CHARACTERISTICS



1623

R-F POWER AMPLIFIER, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	6.3	a-c or d-c volts
Current	2.5	amp.
Amplification Factor	20	
Direct Interelectrode Capacitances:		
Grid to Plate	6.7	μμf
Grid to Filament	5.7	μμf
Plate to Filament	0.9	μμf
Maximum Overall Length		6-9/16"
Maximum Diameter		2-7/16"
Bulb		ST-19
Cap		Medium Metal
Base		Medium 4-Pin Ceramic, Bayonet
RCA Socket		Type UR-542-A

MAXIMUM CCS and ICAS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service
ICAS = Intermittent Commercial and Amateur Service

A-F POWER AMPLIFIER & MODULATOR - Class B

	CCS	*ICAS*	
D-C Plate Voltage	750 max.	1000 max.	volts
Max.-Signal D-C Plate Current*	100 max.	100 max.	ma.
Max.-Signal Plate Input*	75 max.	100 max.	watts
Plate Dissipation*	25 max.	30 max.	watts

Typical Operation:
Unless otherwise specified, values are for 2 tubes

D-C Plate Voltage	500	750	1000	volts
D-C Grid Voltage □	-10	-25	-40	volts
Peak A-F Grid-to-Grid Volt.	170	200	230	volts
Zero-Sig. D-C Plate Cur.	40	35	30	ma.
Max.-Sig. D-C Plate Cur.	200	200	200	ma.
Load Res. (Per tube)	1300	2100	3000	ohms
Effective Load Res. (plate to plate)	5200	8400	12000	ohms
Max.-Sig. Driving Power (Approx.)	3.5	4	4.2	watts
Max.-Sig. Power Output (Approx.)	60	100	145	watts

* Averaged over any audio-frequency cycle of sine-wave form.

R-F POWER AMPLIFIER - Class B Telephony

Carrier Conditions per tube for use with a max. modulation fact. of 1.0

	CCS	*ICAS*	
D-C Plate Voltage	750 max.	1000 max.	volts
D-C Plate Current	50 max.	50 max.	ma.
Plate Input	37.5 max.	45 max.	watts
Plate Dissipation	25 max.	30 max.	watts

Typical Operation:

D-C Plate Voltage	500	750	1000	volts
D-C Grid Voltage □	-25	-40	-50	volts
Peak R-F Grid Voltage	50	60	62	volts
D-C Plate Current	50	50	45	ma.

□ with a-c filament supply.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

1623

R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

	CCS		ICAS	
D-C Grid Current (Approx.)**	2	1.5	0.5	ma.
Driving Power (Approx.)**°	1.8	1.4	1.7	watts
Power Output (Approx.)	7.5	12.5	16	watts

° At crest of a-f cycle with modulation factor of 1.0

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS		ICAS	
D-C Plate Voltage	600 max.		750 max.	volts
D-C Grid Voltage	-200 max.		-200 max.	volts
D-C Plate Current	83 max.		100 max.	ma.
D-C Grid Current	25 max.		25 max.	ma.
Plate Input	50 max.		75 max.	watts
Plate Dissipation	17.5 max.		25 max.	watts
Typical Operation:				
D-C Plate Voltage	500	600	750	volts
D-C Grid Voltage §□	-125	-125	-125	volts
	5000	5000	6250	ohms
Peak R-F Grid Voltage	200	200	215	volts
D-C Plate Current	83	83	100	ma.
D-C Grid Current (Approx.)**	25	25	20	ma.
Driving Power (Approx.)**	5	5	4	watts
Power Output (Approx.)	30	38	55	watts

§ Obtained by grid resistor of value shown or by partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation#

	CCS		ICAS	
D-C Plate Voltage	750 max.		1000 max.	volts
D-C Grid Voltage	-200 max.		-200 max.	volts
D-C Plate Current	100 max.		100 max.	ma.
D-C Grid Current	25 max.		25 max.	ma.
Plate Input	75 max.		100 max.	watts
Plate Dissipation	25 max.		30 max.	watts
Typical Operation:				
D-C Plate Voltage	500	750	1000	volts
D-C Grid Voltage ★□	-70	-85	-90	volts
	4100	5000	4500	ohms
	600	730	750	ohms
Peak R-F Grid Voltage	140	160	172	volts
D-C Plate Current	100	100	100	ma.
D-C Grid Current (Approx.)**	17	17	20	ma.
Driving Power (Approx.)**	2.2	2.5	3.1	watts
Power Output (Approx.)	33	55	75	watts

★ Obtained by grid resistor (4100, 5500, 4500), by cathode resistor (600, 730, 750) or from fixed-bias source. When the 1623 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With plate voltage of 1000 volts, a fixed bias of at least -35 volts should be used.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

□ With a-c filament supply.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

1623

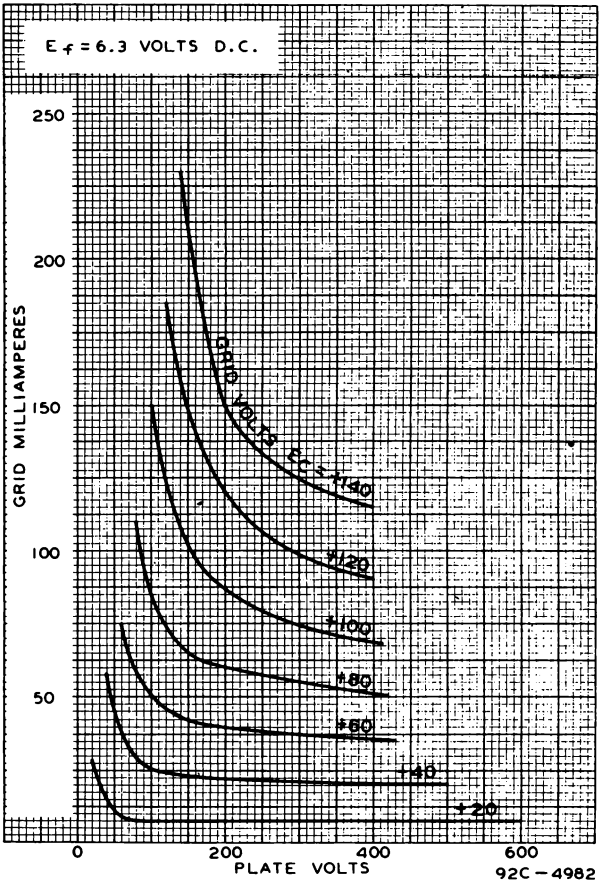
R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

Data on operating frequencies for the 1623 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

OUTLINE DIMENSIONS, TUBE SYMBOL, and SOCKET CONNECTIONS for the 1623 are the same as for the 809.

TYPICAL CHARACTERISTICS



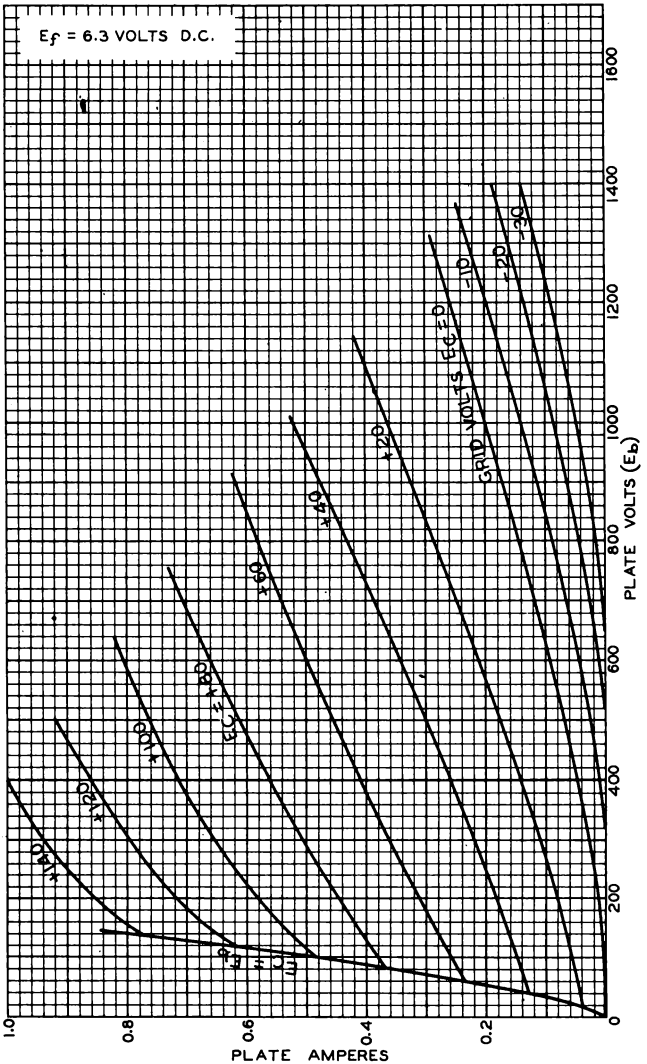
92C-4982

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

1623

1623

AVERAGE PLATE CHARACTERISTICS



OCT. 10, 1938

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4980

1624

TRANSMITTING BEAM POWER AMPLIFIER

Filament	Coated	
Voltage	2.5	a-c or d-c volts
Current	2.0	amp.
Transconductance for plate current of 50 ma.	4000 approx.	µmhos
Direct Interelectrode Capacitances:		
Grid to Plate	0.25 max.⊙	µµf
Input	11	µµf
Output	7.5	µµf
Maximum Overall Length		5-3/4"
Maximum Diameter		2-1/16"
Bulb		ST-16
Cap		Small Metal
Base		Medium 5-Pin
RCA Socket		Stock No.9920

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

PUSH-PULL AMPLIFIER - Class AB_2 ††

D-C Plate Voltage		600 max.	volts
D-C Screen Voltage (Grid #2)		300 max.	volts
Max.-Sig. D-C Plate Current *		90 max.	ma.
Max.-Sig. Plate Input *		54 max.	watts
Screen Input *		3.5 max.	watts
Plate Dissipation *		25 max.	watts
Typical Operation (Fixed bias):			
Unless otherwise specified, values are for 2 tubes			
D-C Plate Voltage	400	600	volts
D-C Screen Voltage	300	300	volts
D-C Grid Voltage (Grid #1) □ o	-16.5	-25	volts
Peak A-F Grid-to-Grid Voltage	77	106	volts
Zero-Sig. D-C Plate Current	75	42	ma.
Max.-Sig. D-C Plate Current	150	180	ma.
Zero-Sig. D-C Screen Current	6.5	5	ma.
Max.-Sig. D-C Screen Current	11.5	15	ma.
Load Resistance (per tube)	1500	1870	ohms
Effective Load Res. (plate to plate)	6000	7500	ohms
Peak Grid Input Power	0.4	1.2	watts
Max.-Sig. Power Output **	36	72	approx.watts

* Averaged over any audio-frequency cycle of sine-wave form.
o For a-c filament supply, if d.c. is used, the stated voltages should be decreased by 1.75 volts.
□ Driver stage should be capable of supplying the grids of the class AB_2 stage with the specified peak grid voltage at low distortion. The effective resistance per grid circuit should be kept below 500 ohms and the effective impedance at the highest desired response frequency should not exceed 700 ohms.
** With zero-impedance driver and perfect regulation, plate-circuit distortion does not exceed 2%. In practice, plate-voltage regulation, screen-voltage regulation, and grid-bias regulation should not be greater than 5%, 5%, and 3%, respectively.
⊙ With external shielding.

†† See end of tabulation.

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		600 max.	volts
D-C Screen Voltage (Grid #2)		300 max.	volts
D-C Grid Voltage (Grid #1)		-200 max.	volts
D-C Plate Current		75 max.	ma.
Plate Input		37.5 max.	watts
Screen Input		2.5 max.	watts
Plate Dissipation		25 max.	watts
Typical Operation:			
D-C Plate Voltage	400	600	volts
D-C Screen Voltage #	250	300	volts
D-C Grid Voltage +	-50	-60	volts
Peak R-F Grid Voltage	58	58	volts
Peak A-F Grid Voltage	30	30	volts
D-C Plate Current	31	40	ma.
D-C Screen Current	1.5	2.5	ma.

Obtained from a fixed supply or from a separate source.
\+ See end of tabulation.

← Indicates a change

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

1624

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

D-C Grid Current	1.2	0	approx.ma.
Driving Power °°	0.25	0.4	approx.watt
Power Output	3.8	8	approx.watts

°° At crest of audio-frequency cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		500 max.	volts
D-C Screen Voltage (Grid #2)		300 max.	volts
D-C Grid Voltage (Grid #1)		-200 max.	volts
D-C Plate Current		75 max.	ma.
D-C Grid Current		5 max.	ma.
Plate Input		37.5 max.	watts
Screen Input		2.5 max.	watts
Plate Dissipation		16.5 max.	watts
→ Typical Operation:			
D-C Plate Voltage □	325	500	volts
D-C Screen Voltage	285	275	volts
D-C Grid Voltage ★ +	-50	-50	volts
	18000	15000	ohms
Peak R-F Grid Voltage	70	80	volts
D-C Plate Current	62	75	ma.
D-C Screen Current	7.5	9	ma.
D-C Grid Current	2.8	3.3	approx.ma.
Driving Power	0.18	0.25	approx.watt
Power Output	13	24	approx.watts

□ Obtained preferably from a modulated fixed supply.

★ Obtained by grid resistor of value shown or by suitable combination of grid resistor with either fixed supply or cathode resistor.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage		600 max.	volts
D-C Screen Voltage (Grid #2)		300 max.	volts
D-C Grid Voltage (Grid #1)		-200 max.	volts
D-C Plate Current		90 max.	ma.
D-C Grid Current		5 max.	ma.
Plate Input		54 max.	watts
Screen Input		3.5 max.	watts
Plate Dissipation		25 max.	watts
→ Typical Operation:			
D-C Plate Voltage	400	600	volts
D-C Screen Voltage ●	300	300	volts
D-C Grid Voltage ◇ +	-55	-60	volts
	11000 ⊕	12000 ⊕	ohms
	610 ⊕	570 ⊕	ohms
Peak R-F Grid Voltage	80	95	volts
D-C Plate Current	75	90	ma.
D-C Screen Current	10.5	10	ma.
D-C Grid Current	5	5	approx. ma.
Driving Power	0.36	0.43	approx. watt
Power Output	19.5	35	approx. watts

● Obtained preferably from a fixed supply of value shown.

◇ Obtained by grid leak(⊕) or cathode resistor (⊕) of values shown, fixed supply, or by combination methods.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

+ The total effective grid-circuit resistance should not exceed 25000 ohms.

†† Subscript (2) indicates that grid current flows during a part of input cycle.

→ Indicates a change

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

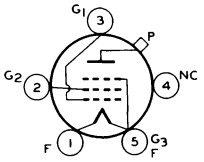
1624

TRANSMITTING BEAM POWER AMPLIFIER

OUTLINE DIMENSIONS for the 1624 are the same as those for the 807. For CURVES, refer to Type 1619.

Data on operating frequencies for the 1624 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY. ←

BOTTOM VIEW OF
SOCKET CONNECTIONS



Pin 1 - Filament
Pin 2 - Grid No.2
Pin 3 - Grid No.1
Pin 4 - No Connection
Pin 5 - Filament -, Grid No.3
Cap - Plate

MOUNTING POSITION

VERTICAL: Base up or down.
HORIZONTAL: No.

← Indicates a change.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

1625

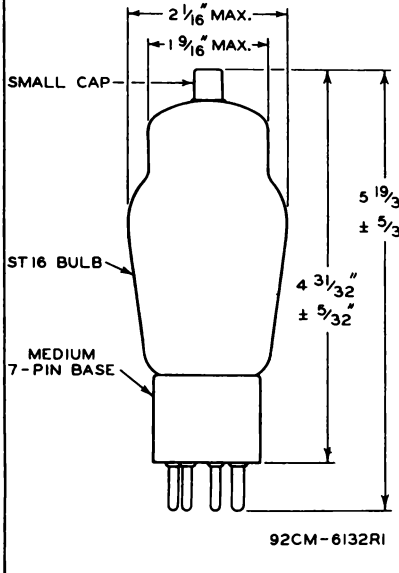
TRANSMITTING BEAM POWER AMPLIFIER

Heater	Coated Unipotential Cathode	
Voltage	12.6 (±10%)	a-c or d-c volts
Current	0.45	amp.
Transconductance for plate cur. of 72 ma.	6000 approx.	µmhos
Grid-Screen Mu-Factor	8	
Direct Interelectrode Capacitances:		
Grid to Plate (With external shielding)	0.2 max.	µµf
Input	11	µµf
Output	7	µµf
Overall Length	5-19/32" ± 5/32"	←
Seated Height	4-31/32" ± 5/32"	←
Maximum Diameter	2-1/16"	
Bulb	ST-16	
Cap	Small	
Base	Medium 7-Pin, Micanol	

Maximum Ratings Are Absolute Values

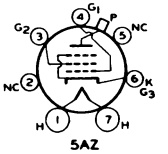
MAXIMUM CCS and ICAS RATINGS with TYPICAL OPERATING CONDITIONS

These are the same as those for Type 807 except that maximum d-c heater-cathode potential is 135 volts. Curves under the 807 also apply to the 1625.



TUBE MOUNTING POSITION
Any

BOTTOM VIEW OF SOCKET CONNECTIONS



5AZ

Pin 1 - Heater
Pin 2 - No Connection
Pin 3 - Grid No.2
Pin 4 - Grid No.1
Pin 5 - No Connection
Pin 6 - Cathode, Grid No.3
Pin 7 - Heater
Cap - Plate

← Indicates a change.

1626

TRANSMITTING TRIODE

For oscillator applications requiring unusually stable characteristics

Heater°	Coated Unipotential Cathode	
Voltage	12.6	a-c or d-c volts
Current	0.25	amp.
Amplification Factor	5	
Direct Interelectrode Capacitances:		
Grid to Plate	4.4	μμf
Grid to Cathode	3.2	μμf
Plate to Cathode	3.4	μμf
Maximum Overall Length		4-1/8"
Maximum Seated Height		3-9/16"
Maximum Diameter		1-9/16"
Bulb		ST-12
Base	Small Shell Octal 8-Pin, MICANOL#	

MAXIMUM CCS RATINGS and TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage	250 max.	volts
D-C Grid Voltage	-150 max.	volts
D-C Plate Current	25 max.	ma.
D-C Grid Current	8 max.	ma.
Plate Input	6.25 max.	watts
Plate Dissipation	5 max.	watts
Typical Operation:		
D-C Plate Voltage	250	volts
D-C Grid Voltage*	-70	volts
	14000	ohms
	2300	ohms
Peak R-F Grid Voltage	105	volts
D-C Plate Current	25	ma.
D-C Grid Current**	5 approx.	ma.
Driving Power**	0.5 approx.	watt
Power Output	4 approx.	watts

° In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

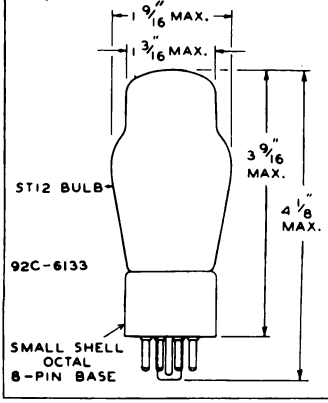
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

* Obtained from fixed supply (-70), by grid resistor (14000), or cathode resistor (233), or by combination methods. When the 1626 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a low value. With plate volts of 250, a fixed bias of at least -35 volts must be used.

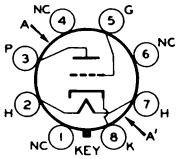
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

\# Registered trademark.

Data on operating frequencies for the 1626 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.



BOTTOM VIEW OF SOCKET CONNECTIONS



AA' = PLANE OF ELECTRODES

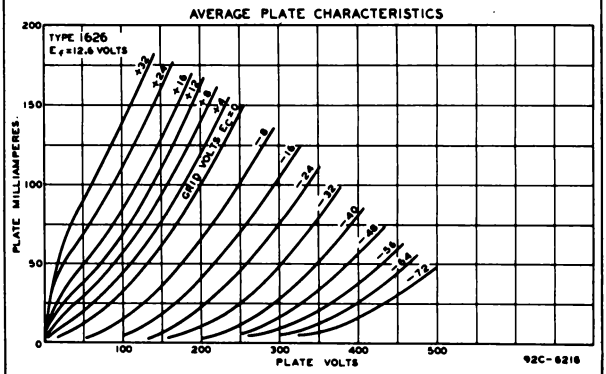
Pin 1 - No Connection
Pin 2 - Heater
Pin 3 - Plate
Pin 4 - No Connection
Pin 5 - Grid
Pin 6 - No Connection
Pin 7 - Heater
Pin 8 - Cathode

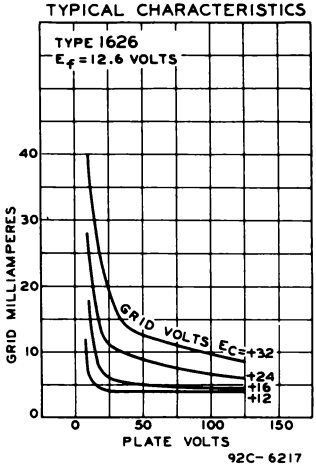
TUBE MOUNTING POSITION

VERTICAL or HORIZONTAL

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

1626
TRANSMITTING TRIODE





5556
POWER TRIODE

Useful at frequencies up to 30 Mc

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:
- Voltage . . . . . 4.5 . . . . . .ac or dc volts
- Current . . . . . 1.1 . . . . . amp

Amplification Factor, for
- plate volts = 350,
- grid volts = -20, and
- plate ma = 19 . . . . . 8.5

Direct Interelectrode Capacitances: ←
- Grid to plate . . . . . 6.7 . . . . . μμf
- Grid to filament. . . . . 2.3 . . . . . μμf
- Plate to filament . . . . 2.2 . . . . . μμf

Mechanical:

Mounting Position . . . . . Vertical, base down or up, or Horizontal with pins 1 and 4 in vertical plane

Maximum Overall Length. . . . . 4-1/2" ←

Maximum Diameter. . . . . 1-5/8" ←

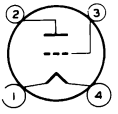
Weight (Approx.). . . . . 2 oz ←

Base. . . . . .Medium-Shell Small 4-Pin with Bayonet (JETEC No. A4-10) ←

Basing Designation for BOTTOM VIEW. . . . . 4D ←

Pin 1 - Filament

Pin 2 - Plate



Pin 3 - Grid

Pin 4 - Filament

AF POWER AMPLIFIER & MODULATOR -- Class A

Maximum Ratings, *Absolute Values:*

DC PLATE VOLTAGE.	350 max.	volts
PLATE DISSIPATION	7.5 max.	watts

Typical Operation:

DC Plate Voltage.	350	volts
DC Grid Voltage●.	-30	volts
Peak AF Grid Voltage (Approx.).	30	volts
DC Plate Current.	9	ma
Plate Resistance (Approx.).	8700	ohms
Load Resistance	18000	ohms
Second Harmonic Distortion.	5	%
Power Output.	0.6	watt

RF POWER AMPLIFIER -- Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

DC PLATE VOLTAGE.	350 max.	volts

●: See next page. ← Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5556
POWER TRIODE

DC PLATE CURRENT	40 max.	ma
PLATE INPUT	14 max.	watts
PLATE DISSIPATION	10 max.	watts

Typical Operation:

DC Plate Voltage	350	volts
DC Grid Voltage●	-40	volts
Peak RF Grid Voltage	90	volts
DC Plate Current	32	ma
Driving Power (Approx.)#	0.1	watt
Power Output	2	watts

PLATE-MODULATED RF POWER AMPLIFIER -- Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

DC PLATE VOLTAGE	350 max.	volts
DC GRID VOLTAGE	-150 max.	volts
DC PLATE CURRENT	40 max.	ma
DC GRID CURRENT	10 max.	ma
PLATE INPUT	14 max.	watts
PLATE DISSIPATION	7 max.	watts

Typical Operation:

DC Plate Voltage	300	volts
DC Grid Voltage●	-100	volts
Peak RF Grid Voltage (Approx.)	140	volts
DC Plate Current	30	ma
DC Grid Current (Approx.)	2	ma
Driving Power (Approx.)	0.3	watt
Power Output (Approx.)	4	watts

RF POWER AMPLIFIER & OSCILLATOR -- Class C Telegraphy□ and RF POWER AMPLIFIER -- Class C FM Telephony

Maximum Ratings, *Absolute Values:*

DC PLATE VOLTAGE	350 max.	volts
DC GRID VOLTAGE	-150 max.	volts
DC PLATE CURRENT	40 max.	ma
DC GRID CURRENT	10 max.	ma
PLATE INPUT	14 max.	watts
PLATE DISSIPATION	10 max.	watts

Typical Operation:

DC Plate Voltage	350	volts
DC Grid Voltage●	-80	volts
Peak RF Grid Voltage	130	volts

● With dc filament excitation.

#,□: See next page.

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5556

POWER TRIODE

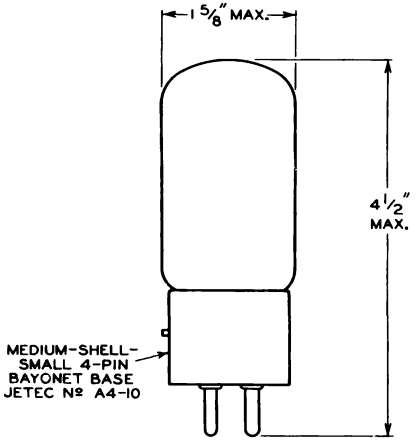
DC Plate Current	35	ma
DC Grid Current (Approx.)	2	ma
Driving Power (Approx.).	0.25	watt
Power Output (Approx.)	6	watts

At crest of af cycle with modulation factor of 1.

□ Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

MAXIMUM RATINGS vs OPERATING FREQUENCY

FREQUENCY	6	15	30	Mc
MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE AND PLATE INPUT:				
Class B Telephony	100	85	70	%
Class C Telephony	100	75	50	%
Class C Telegraphy	100	75	50	%



92CS-6717R1

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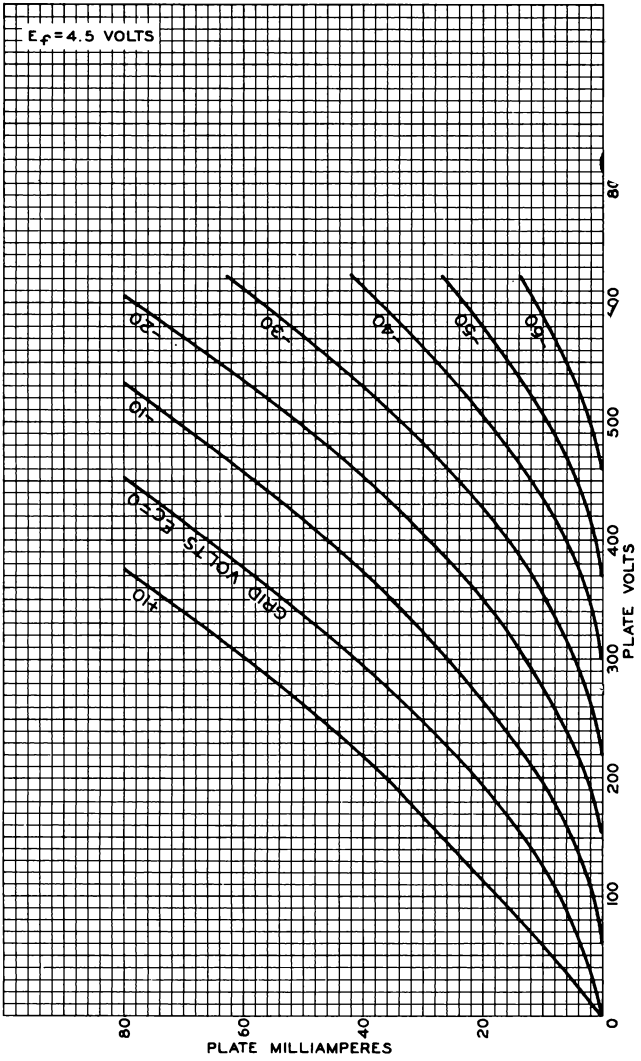
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5556

5556

AVERAGE PLATE CHARACTERISTICS



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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6718R1

5558

HALF-WAVE MERCURY-VAPOR RECTIFIER

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:	*Min.*	*Av.*	*Max.*	
Voltage	4.75	5.0	5.25	volts
Current at 5 volts	–	4.5	4.9	amp
Cathode:				
Heating Time, before tube conduction	5	–	–	minutes
Tube Voltage Drop	–	15	–	volts
Critical Anode Voltage	–	–	50	volts

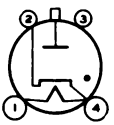
Mechanical:

Mounting Position	Vertical, Base Down
Maximum Overall Length	7"
Seated Length	6-1/4" ± 1/4"
Maximum Diameter	3"
Bulb	ST-23
Cap	Medium (JETEC No. C1-5)
Base	Medium-Shell Small 4-Pin, Bayonet (JETEC No. A4-10)

BOTTOM VIEW

Pin 1 – Heater

Pin 2 – Cathode (Anode Return)



Pin 3 – No Conn.

Pin 4 – Heater, Cathode

Cap – Anode

Temperature Control:

Heating--When the ambient temperature is so low that the normal rise of condensed-mercury temperature above the ambient temperature will not bring the condensed-mercury temperature up to the minimum value of the operating ranges specified under *Maximum Ratings*, some form of heat-conserving enclosure or auxiliary heater will be required.

Cooling--When the operating conditions are such that the maximum value of the operating condensed-mercury temperature range is exceeded, provision should be made for forced-air cooling sufficient to prevent exceeding the maximum value.

Temperature Rise of Condensed Mercury to Equilibrium Above Ambient Temperature (Approx.):●

No Load	22 °C
Full Load	28 °C

● With heater volts = 4.75 and no heat-conserving enclosure.

← indicates a change

5558

5558

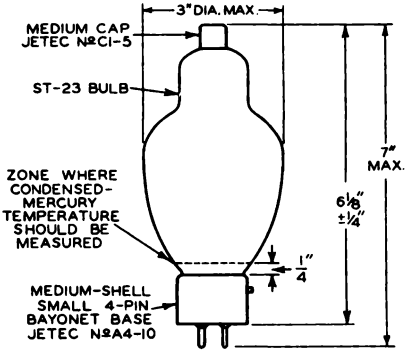
HALF-WAVE MERCURY-VAPOR RECTIFIER

HALF-WAVE RECTIFIER

Maximum Ratings, *Absolute Values: Up to 150 cps*

	Operating Condensed-Mercury Temperature Range 30° to 80°C	30° to 60°C	
PEAK INVERSE ANODE VOLTAGE	2000 max.	5000 max.	volts
CATHODE CURRENT:			
Peak	15 max.	15 max.	amp
Average■.	2.5 max.	2.5 max.	amp
Fault, for duration of 0.1 second max.	200 max.	200 max.	amp

■ Averaged over any interval of 15 seconds maximum.

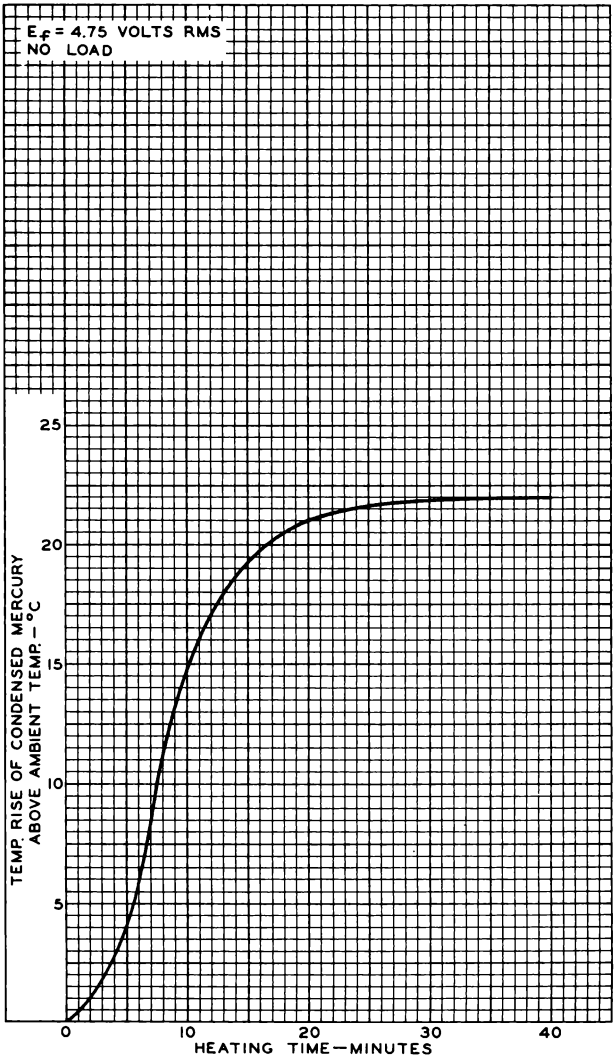


92CS-6701R3

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5558

RATE OF RISE OF COND.-MERCURY TEMPERATURE



5561

5561
HALF-WAVE MERCURY-VAPOR RECTIFIER

DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage*	5	volts
Current	10	amp
Peak Voltage Drop(Approx.)	15	volts

Mechanical:

Mounting Position	Vertical, Base Down
Overall Length	11" ± 1/4 "
Maximum Diameter	3-13/16"
Bulb	ST-30
Cap	3917
Base	Large Metal-Shell Super-Jumbo 4-Pin, Bayonet

Maximum Ratings, Absolute Values:

	Continuous Service	Welder-Control Service	
PEAK INVERSE ANODE VOLTAGE	3000 max.	10000 max.	volts
INSTANTANEOUS ANODE CURRENT:			
Below 25 Cycles	12.8 max.	8 max.	amp
25 Cycles and Higher	40 max.	16 max.	amp
AVERAGE ANODE CURRENT#	6.4 max.	4 max.	amp
SURGE ANODE CURRENT for 0.1 sec. max.	200 max.	80 max.	amp
COND.-MERCURY TEMP. RANGE□	40 - 80	25 - 50	°C

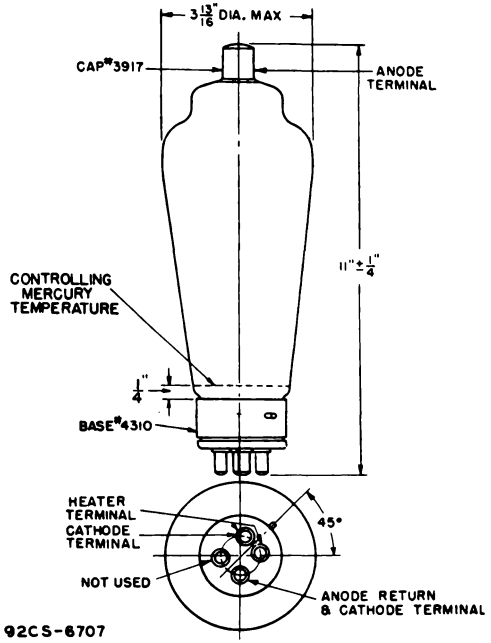
* Heater voltage must be applied at least 5 minutes before anode voltage is applied.

\# Averaged over any 15-second interval.

□ Recommended condensed-mercury temperature 40°C.

5561

HALF-WAVE MERCURY-VAPOR RECTIFIER



5588

5588
UHF POWER TRIODE

FORCED-AIR COOLED, GROUNDED-GRID TYPE

GENERAL DATA

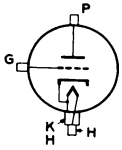
Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	2.5	amp
Minimum Heating Time ▲	1.0	minute
Amplification Factor	16	
Direct Interelectrode Capacitances:		
Grid to Plate	6.0	μμf
Grid to Cathode	13	μμf
Plate to Cathode°	0.32 max.	μμf

° With external shield connected to grid.

Mechanical:

Terminal Connections:
- H - Heater Pin Terminal
- K & H - RF Cathode and Heater Cylindrical Terminal



- G - Grid RF Cylindrical Terminal
- P - Plate RF Contact Surface on Plate Ring

Mounting Position	Vertical, with radiator up or down
Overall Length	3-5/16" ± 3/32"
Maximum Diameter	1.750" ± 0.010"
Radiator	Integral Part of Tube
Mounting	Special
Air Flow:	
Through Radiator (for max. rated dissipation)	10 min. cfm

The specified air flow at a pressure of 1/2 inch of water should be delivered by a blower through the radiator toward the bulb and onto the grid terminal before and during the application of any voltages. Operation of tube at less than maximum rated dissipation will require less cooling as shown by accompanying curve of cooling requirements.

Incoming-Air Temperature	45 max.	°C
Radiator Temperature	180 max.	°C
Grid-Terminal Temperature	140 max.	°C

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	800 max.	volts
DC GRID VOLTAGE	-200 max.	volts
DC PLATE CURRENT	250 max.	ma.
DC GRID CURRENT	80 max.	ma.
PLATE INPUT	170 max.	watts
PLATE DISSIPATION	130 max.	watts

▲ Rated heater voltage must be applied for a minimum time of 1 minute before voltages are applied to the other electrodes. Heater voltage may then be reduced to the indicated typical operating value.

● Continuous Commercial Service.

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UHF POWER TRIODE

Typical Operation in Grounded-Grid Circuit at 1000 Mc:

Heater Voltage▲	5	volts
DC Plate Voltage	650	volts
DC Grid Voltage	-70	volts
DC Plate Current	250	ma.
DC Grid Current (Approx.)	30	ma.
Driving Power (Required by tube and input circuit)*	32	watts
Power Output (Approx.)	65	watts

* Approximate. A portion of this power appears in the load circuit. In grounded-grid plate-modulated class C rf power amplifier service, the 5588 can be modulated 100 per cent if the rf driver stage is also modulated 100 per cent simultaneously. Care should be taken to insure that the driver-modulation and the amplifier-modulation voltages are exactly in phase.

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without amplitude modulation □

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	1000 max.	volts
DC GRID VOLTAGE	-200 max.	volts
DC PLATE CURRENT	300 max.	ma.
DC GRID CURRENT	100 max.	ma.
PLATE INPUT	250 max.	watts
PLATE DISSIPATION	200 max.	watts

Typical Operation as Grounded-Grid Amplifier at 1000 Mc:

Heater Voltage▲	4.5	volts
DC Plate Voltage	835	volts
DC Grid Voltage	-70	volts
DC Plate Current	300	ma.
DC Grid Current (Approx.)	40	ma.
Driving Power (Required by tube and input circuit)#	32	watts
Power Output (Approx.)	100	watts

Typical Operation as Grounded-Grid Oscillator at 1000 Mc:

Heater Voltage▲	3	volts
DC Plate Voltage	835	volts
DC Grid Voltage	-70	volts
From cathode-bias resistor of	205	ohms
DC Plate Current	300	ma.
DC Grid Current (Approx.)	40	ma.
Power Output (Approx.)	75	watts

□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

\# Approximate. A portion of this power appears in the load circuit.

▲,●: See next page.

5588

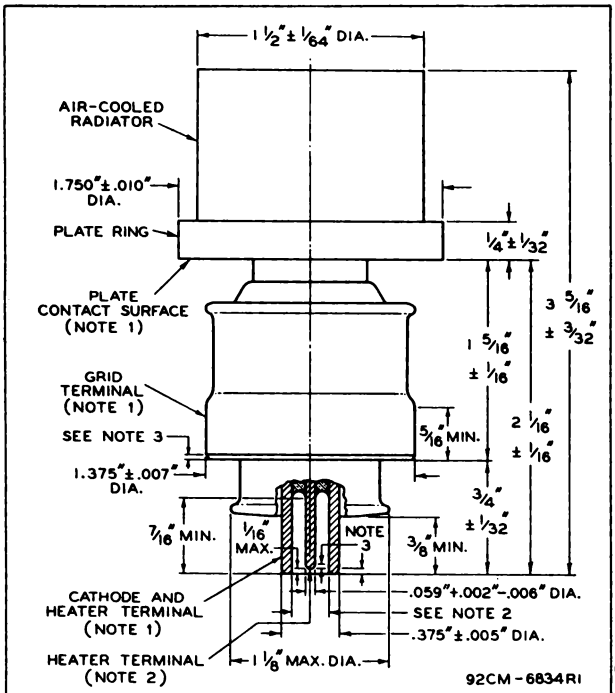
UHF POWER TRIODE

▲ Rated heater voltage must be applied for a minimum time of 1 minute before voltages are applied to the other electrodes. Heater voltage may then be reduced to the indicated typical operating value.

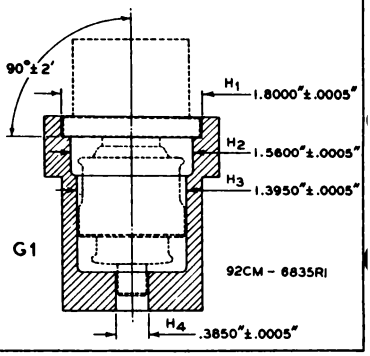
● CCS = Continuous Commercial Service.

Data on operating frequencies for the 5588 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

5588
UHF POWER TRIODE



NOTE 1: WITH THE CYLINDRICAL SURFACES OF ITS GRID AND CATHODE TERMINALS CLEAN, SMOOTH, AND FREE OF BURRS, THE TUBE WILL ENTER A GAUGE AS SHOWN IN SKETCH G1. THE FOUR CYLINDRICAL HOLES H_1, H_2, H_3, and H_4 HAVE AXES COINCIDENT WITHIN 0.0005", LENGTHS DETERMINED FROM THE OUTLINE DRAWING, AND SUCCESSIVELY SMALLER DIAMETERS AS SHOWN IN THE SKETCH.



(continued on next page)

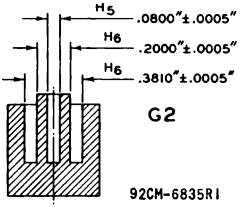
5588
UHF POWER TRIODE

(continued from preceding page)

THE PLAIE RING WILL BE ENTIRELY ENGAGED BY HOLE H_1, AND THE CONTACT SURFACE OF THE PLATE RING WILL SEAT ON THE SHOULDER BETWEEN HOLES H_1 AND H_2. THE PLANE SURFACE OF THIS SHOULDER IS $90^\circ \pm 2'$ TO THE AXES OF THE HOLES. SEATING IS DETERMINED BY FAILURE OF A 0.005" THICKNESS GAUGE, 1/8" WIDE, TO ENTER MORE THAN 1/16" BETWEEN THE SHOULDER SURFACE AND THE PLATE CONTACT SURFACE.

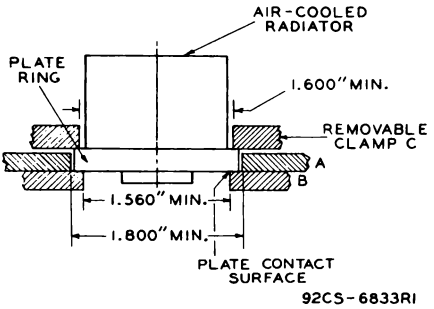
WITH THE TUBE PROPERLY SEATED AS DESCRIBED ABOVE, THE GRID TERMINAL WILL BE ENTIRELY ENGAGED BY HOLE H_3, AND THE CATHODE TERMINAL WILL BE ENGAGED BY HOLE H_4 TO A DEPTH OF AT LEAST 1/4".

NOTE 2: CONCENTRICITY OF THE HEATER TERMINAL WITH RESPECT TO THE CATHODE TERMINAL IS DETERMINED BY A GAUGE AS SHOWN IN SKETCH G2. THE CYLINDRICAL HOLE H_5 AND THE ANNULAR HOLE H_6 HAVE AXES COINCIDENT WITHIN 0.0005", LENGTHS DETERMINED FROM THE OUTLINE DRAWING, AND DIAMETERS AS SHOWN IN THE SKETCH. THE CATHODE TERMINAL AND THE HEATER TERMINAL WILL ENTER THIS GAUGE TO A DEPTH OF 3/8".



NOTE 3: ROUNDED OR BEVELED NOT TO EXCEED 1/16".

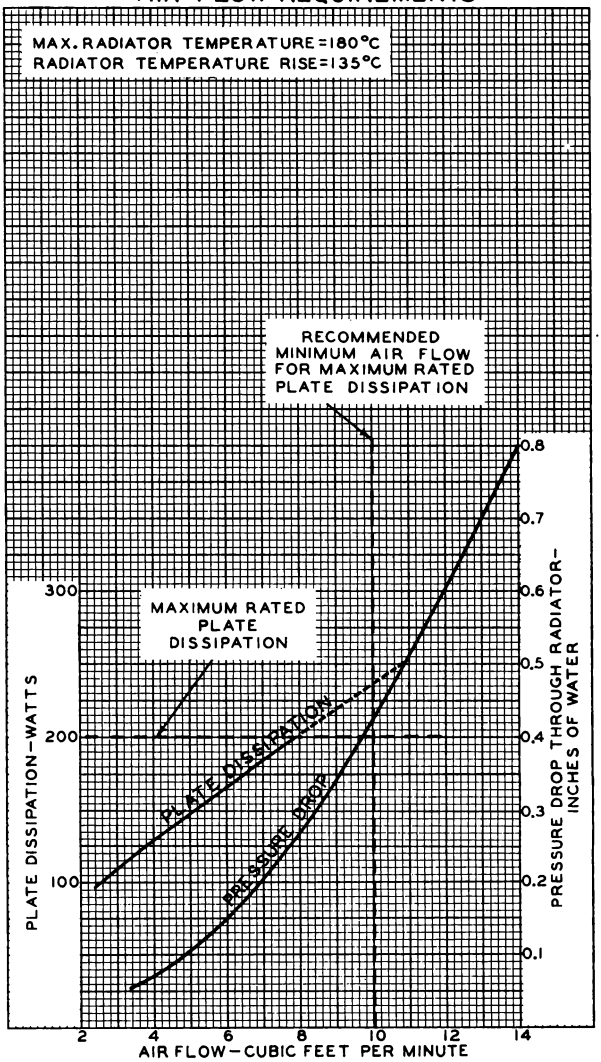
MOUNTING ARRANGEMENT
for use with coaxial-line
or cavity circuits



RCA

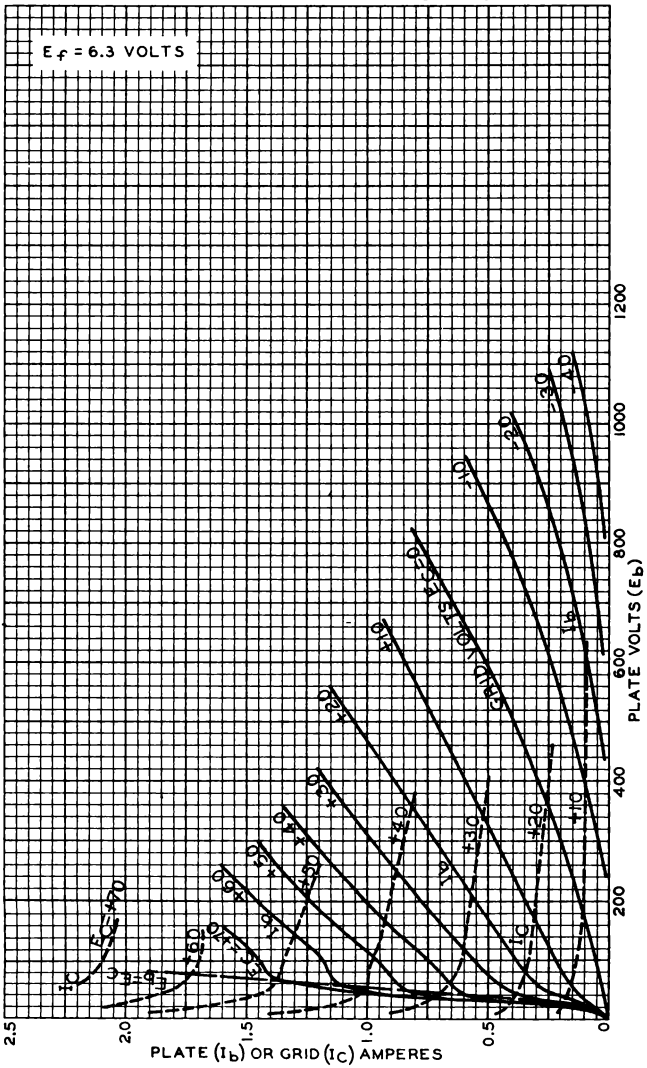
5588

AIR-FLOW REQUIREMENTS



5588

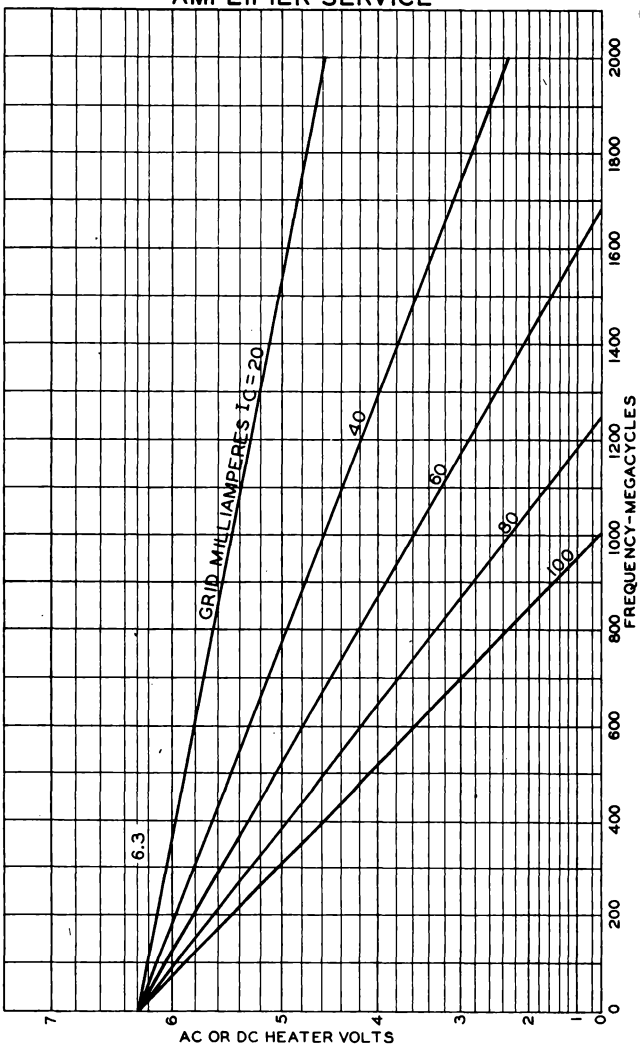
TYPICAL CHARACTERISTICS



5588

5588

RECOMMENDED HEATER VOLTAGES — AMPLIFIER SERVICE



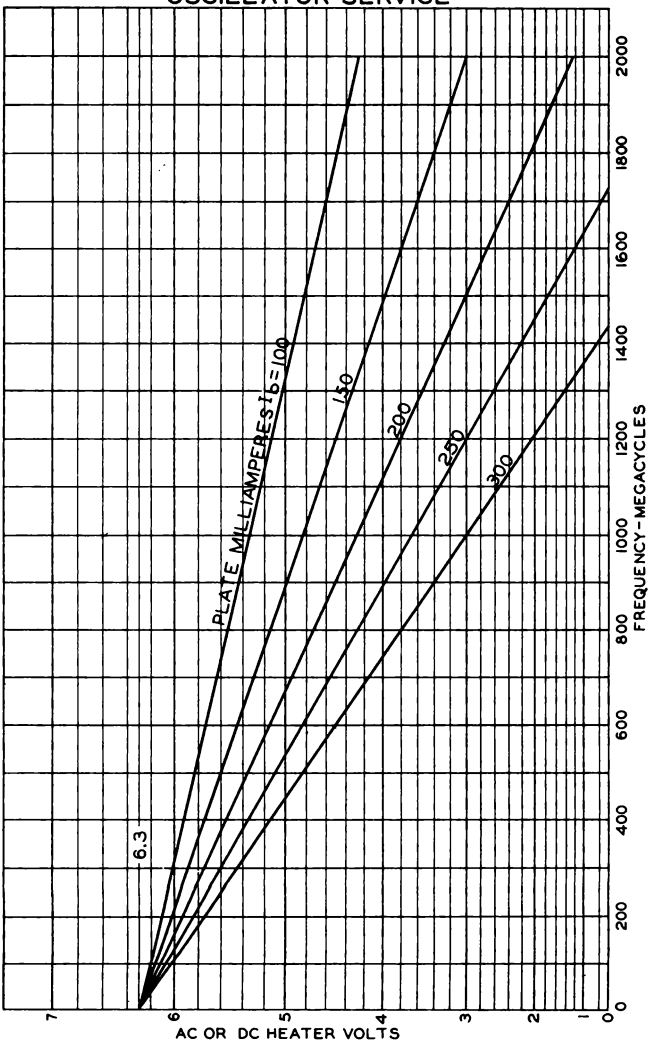
JAN. 29, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6836

5588

RECOMMENDED HEATER VOLTAGES— OSCILLATOR SERVICE



5592

POWER TRIODE

FORCED-AIR-COOLED, GROUNDED-GRID TYPE

GENERAL DATA

Electrical:

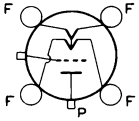
Filament, Multistrand Tungsten:

Excitation . . .	Single-Phase AC or DC	
Voltage.	11	ac or dc volts
Current.	412	amp
Starting Current:	The filament current must never exceed 750 amperes, even momentarily.	
Cold Resistance. . . .	0.0026	ohm
Amplification Factor . .	32	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate.	35	μμf
Grid to Filament . . .	76	μμf
Plate to Filament. . .	1.2	μμf

Mechanical:

Terminal Connections:

F - Filament Posts
G - Grid-Flange Terminal



P - Radiator-Cooled Plate Terminal

DIAMETRICALLY OPPOSITE TERMINALS MUST BE CONNECTED TOGETHER

Mounting Position	Vertical, Filament end up
Maximum Overall Length	17-3/8"
Maximum Diameter	14-1/4"
Radiator	Integral part of tube
Mounting	Special

Air Flow:

Through Radiator (for max. ratings). . . 1100 min. cfm
The specified air flow at a pressure of 2.4 inches of water should be delivered by a blower vertically upward through the radiator. Air flow should be started before the application of any voltages.

To Filament Seals. . . . . 200 min. cfm
The specified air flow from a duct 8 square inches in area directed into the filament header before and during the application of any voltages, is required to limit the temperature of the header and filament seals to the maximum value.

Input-Air Temperature (to radiator). . . .	45 max.	°C
Radiator Temperature (measured in thermometer well). .	180 max.	°C
Bulb Temperature	180 max.	°C
Seal Temperature (filament, grid, plate) .	165 max.	°C

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without amplitude modulation□

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	11500 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	4.5 max.	amp
DC GRID CURRENT	0.8 max.	amp

□,●: See next page.

5592
POWER TRIODE

PLATE INPUT		50 max.	kw
PLATE DISSIPATION		17.5 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	7500	11000	volts
DC Grid Voltage■	-360	-820	volts
	600	1000	ohms
	75	200	ohms
Peak RF Grid Voltage	900	1450	volts
DC Plate Current	4.4	3.6	amp
DC Grid Current (Approx.)*	0.6	0.8	amp
Driving Power (Approx.)*	450	1000	watts
Power Output (Approx.)	20	30	kw

Typical Operation as Amplifier in Grounded-Grid Circuit at 108 Mc:▲

DC Plate Voltage	7500	volts
DC Grid Voltage■	-1000	volts
	1650	ohms
	200	ohms
Peak RF Grid Voltage	1550	volts
DC Plate Current	4.4	amp
DC Grid Current (Approx.)*	0.6	amp
Driving Power (Approx.)	9000	watts
Power Output (Approx.)	27	kw

□ Modulation essentially negative may be used if positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

● Continuous Commercial Service.

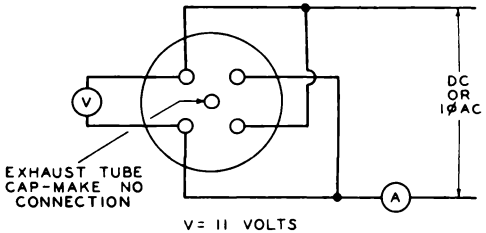
■ Obtained by grid-resistor (600, 1000), cathode-resistor (75, 200) or by partial self-bias methods.

* Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

▲ For Class C Telegraphy or Class C FM Telephony.

Data on operating frequencies for the 5592 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

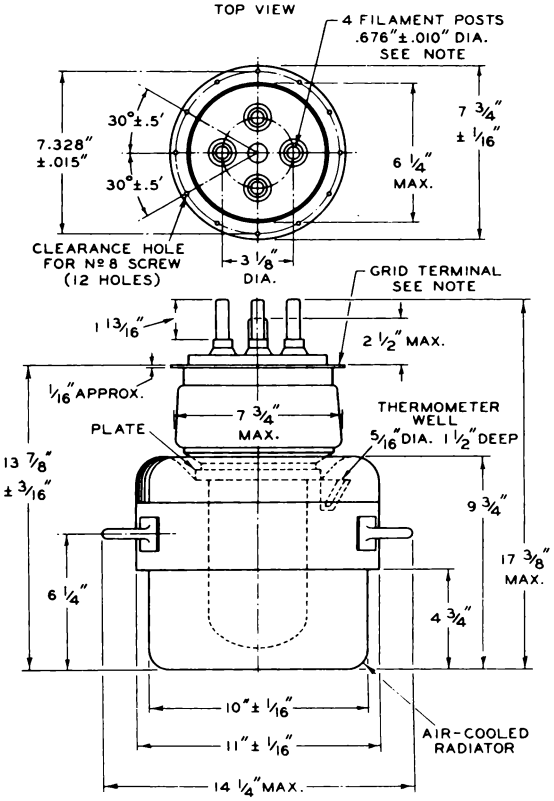
FILAMENT CONNECTIONS



V= 11 VOLTS
A= 412 AMP.

92CS-6828R1

5592
POWER TRIODE



NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

92CM-6827

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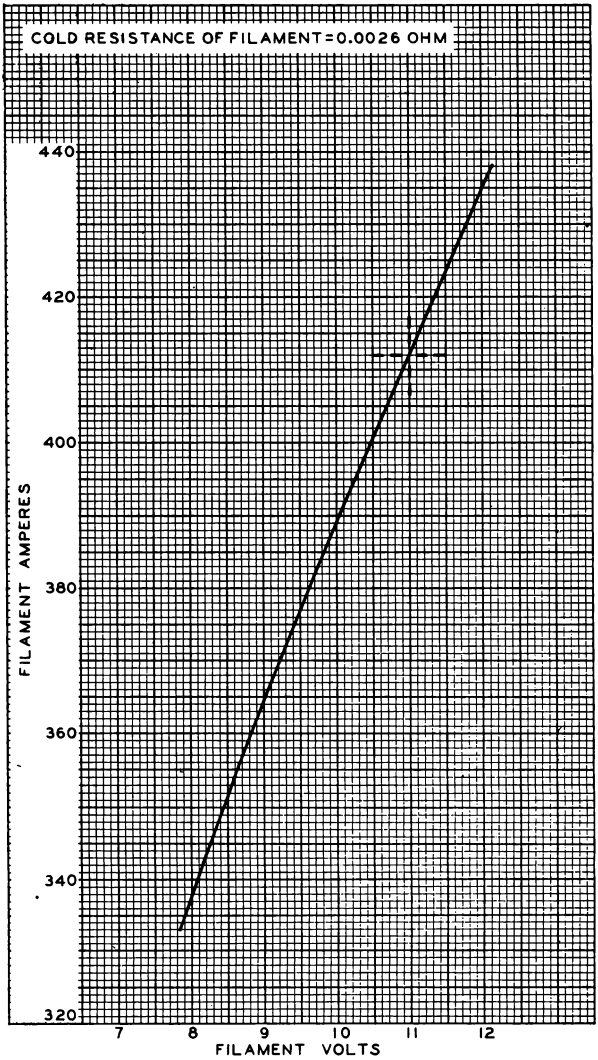
5592

AVERAGE FILAMENT CHARACTERISTIC



FEB. 7, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6839

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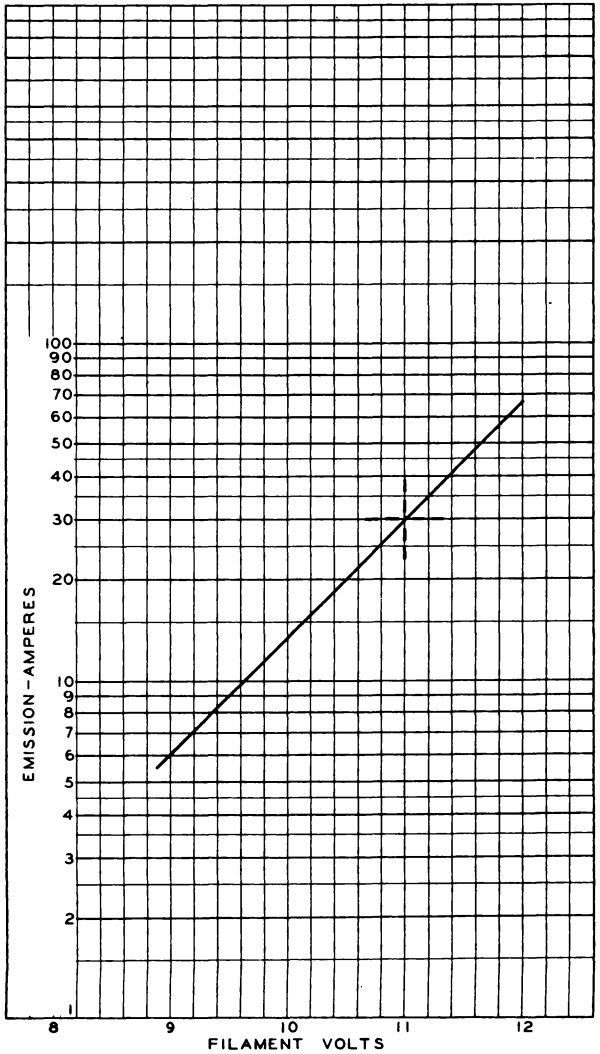
AVERAGE FILAMENT-EMISSION CHARACTERISTIC



FEB. 6, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6838

5592

5592

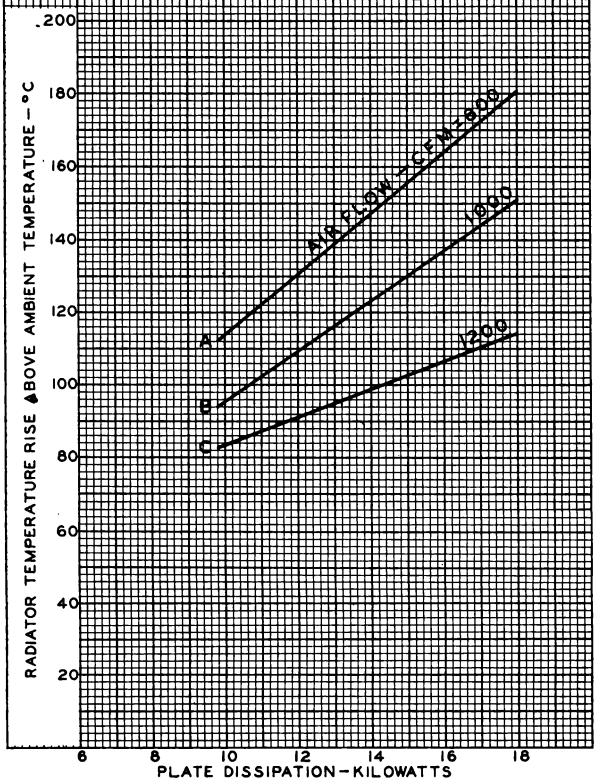
COOLING REQUIREMENTS

E_f = 11 VOLTS AC
MAXIMUM RADIATOR TEMPERATURE = 180°C

CURVE	PRESSURE DROP INCHES OF WATER
A	1.3
B	2.0
C	2.9

CURVES TAKEN ACCORDING TO NAFM* STANDARDS– BULLETIN №103

*NATIONAL ASSOCIATION OF FAN MFRS., GENERAL MOTORS BLDG., DETROIT, MICH.



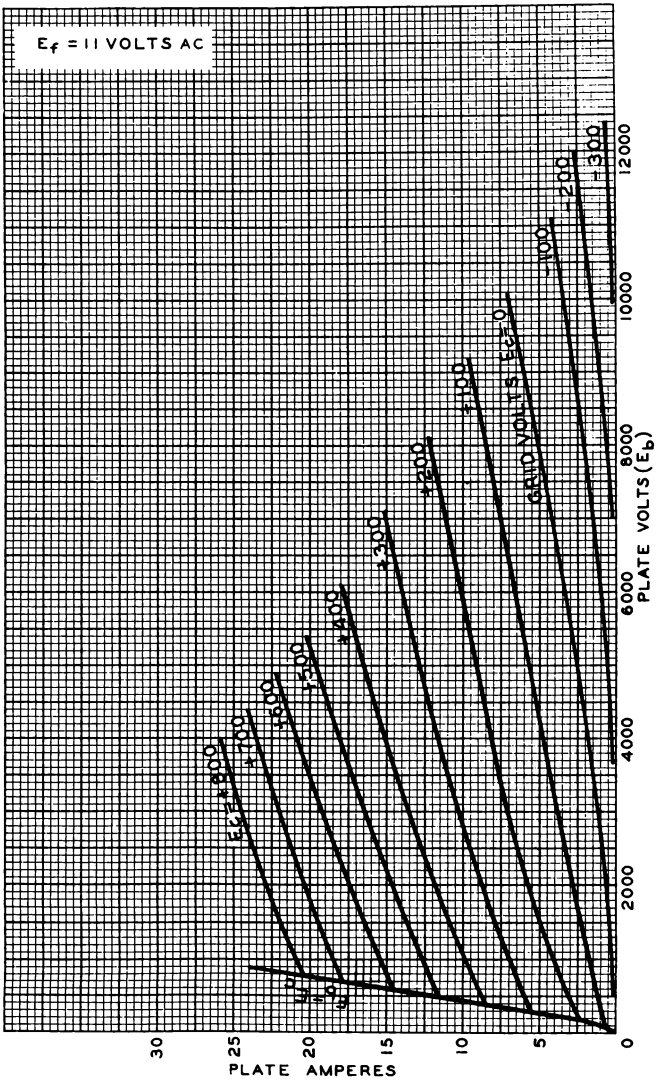
JAN. 17, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6829

5592

AVERAGE PLATE CHARACTERISTICS



MAR. 3, 1947

TUBE DEPARTMENT

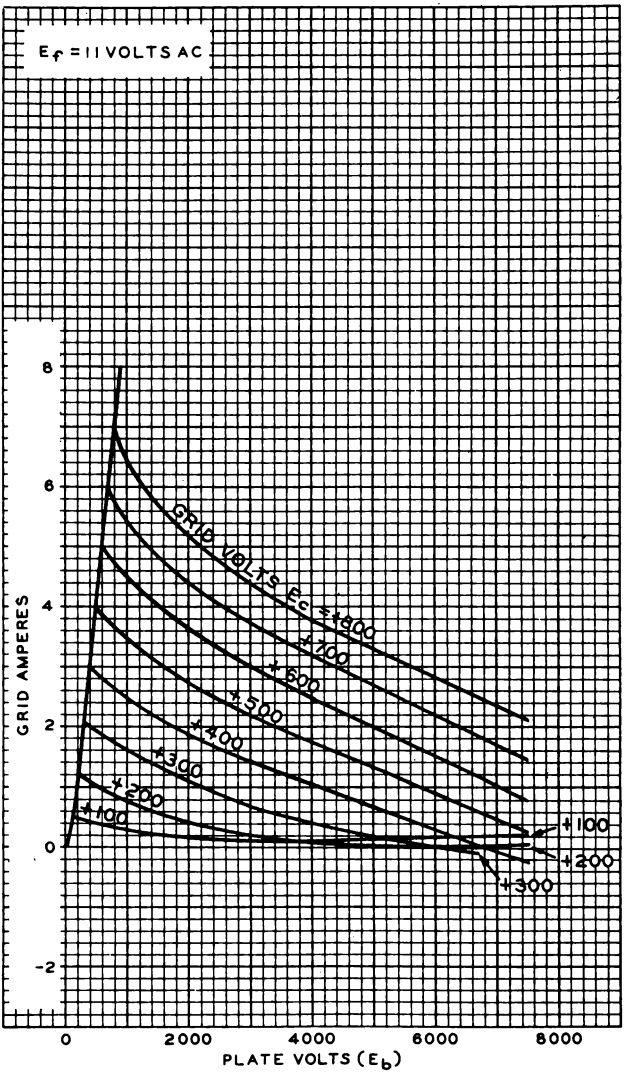
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6843

5592

5592

TYPICAL GRID CHARACTERISTICS



MAR. 3, 1947

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM - 6844

5604-A
POWER TRIODE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament, Multistrand Tungsten:

Voltage.	11	. . . . . ac or dc volts
Current.	176	. . . . . amp

Starting current: The filament current must never exceed a value of 270 amperes, even momentarily.

Cold resistance. . . .	0.0052	. . . . . ohm

NOTE: This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in the General Section.

Amplification Factor, for plate current = 1.25 amp and grid volts = -100. . 20

Direct Interelectrode Capacitances:

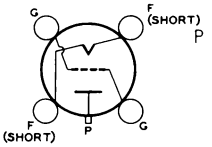
Grid to plate.	24	. . . . . μμf
Grid to filament	27	. . . . . μμf
Plate to filament. . . .	1.25	. . . . . μμf

Mechanical:

Terminal Connections: TOP VIEW

F - Filament

G - Grid



P - Plate (Either of two terminals on radiator band)

Mounting Position. . . . . Vertical, filament end up

Maximum Overall Length . . . . . 13-3/4"

Maximum Diameter (Including radiator handles). . . . . 11"

Radiator . . . . . .Integral part of tube

Air Flow:

Through Radiator--Typical flow values of incoming air at a temperature not exceeding 45°C for various plate dissipations, are indicated in the tabulation below. The air should be delivered by a blower vertically upward through the radiator during the application of any voltages. Under any condition, the air flow must be adequate to limit the temperature of the radiator to its specified maximum value. *See Cooling Requirements curves.*

Percentage of max. rated plate dissipation for each class of service .	100	80	60	per cent
Air flow	650	460	310	cfm
Static pressure.	2	1	0.45	in. of water

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5604-A
POWER TRIODE

To Bulb and Seals--At frequencies below 15 Mc, adequate cooling of the bulb and seals is provided by the air flow through the radiator. At frequencies above 15 Mc, however, additional air flow directed onto the filament end of the tube should be supplied by a blower providing 50 cfm through a 3" nozzle in order to limit the temperature of the grid seals, filament seals, and bulb to 160°C.

Incoming-Air Temperature (To radiator)	45 max.	°C
Radiator Temperature (Measured on core at end adjacent to bulb)	230 max.	°C
Bulb Temperature	160 max.	°C
Seal Temperature (Filament, grid, and plate)	160 max.	°C
Weight (Approx.)	32	lbs

Fittings:

Air Jacket	RCA-211F1
Connector Wrench (2 required)	RCA-212F1
Grid or Filament Connector (4 required)	RCA-216F1
Bracelet	RCA-232F1
Air Manifold	RCA-234F1

AF POWER AMPLIFIER & MODULATOR--Class B

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	12500 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	2.75 max.	amp
MAX.-SIGNAL PLATE INPUT*	32500 max.	watts
PLATE DISSIPATION*	10000 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	8000	10000	12000	volts
DC Grid Voltage	-370	-480	-600	volts
Peak AF Grid-to-Grid Voltage	1620	2020	2380	volts
Zero-Signal DC Plate Current	0.4	0.5	0.6	amp
Max.-Signal DC Plate Current	2.6	3.7	4.5	amp
Effective Load Resistance (Plate to plate)	7200	6100	5900	ohms
Max.-Signal Driving Power (Approx.)	140	150	160	watts
Max.-Signal Power Output (Approx.)	14500	25000	36000	watts

* Averaged over any audio-frequency cycle of sine-wave form.

●: See next page.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5604-A

POWER TRIODE

RF POWER AMPLIFIER--Class B Telephony

Carrier conditions per tube with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	12500 max.	volts
DC PLATE CURRENT	1.4 max.	amp
PLATE INPUT	16000 max.	watts
PLATE DISSIPATION	10000 max.	watts

Typical Operation:

DC Plate Voltage	8000	10000	12000	volts
DC Grid Voltage	-400	-500	-610	volts
Peak RF Grid Voltage	410	490	590	volts
DC Plate Current	0.6	0.8	1.0	amp
DC Grid Current (Approx.)	0	0	0	amp
Driving Power (Approx.)**	75	70	65	watts
Power Output (Approx.)	1700	2800	4400	watts

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	8000 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	1.5 max.	amp
DC GRID CURRENT	0.45 max.	amp
PLATE INPUT	12000 max.	watts
PLATE DISSIPATION	6600 max.	watts

Typical Operation:

DC Plate Voltage	6000	8000	volts
DC Grid Voltage	-740	-1000	volts
Peak RF Grid Voltage	1140	1540	volts
DC Plate Current	0.7	1.1	amp
DC Grid Current (Approx.)	0.09	0.13	amp
Driving Power (Approx.)	100	200	watts
Power Output (Approx.)	3400	7100	watts

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy

Key-down conditions per tube without amplitude modulation□

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	12500 max.	volts
DC GRID VOLTAGE	-2000 max.	volts

● Continuous Commercial Service.

**,□: See next page.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5604-A

5604-A

POWER TRIODE

DC PLATE CURRENT	3 max.	amp
DC GRID CURRENT	0.45 max.	amp
PLATE INPUT	32500 max.	watts
PLATE DISSIPATION	10000 max.	watts

Typical Operation:

DC Plate Voltage	8000	10000	12000	volts
DC Grid Voltage	-680	-870	-1170	volts
Peak RF Grid Voltage	1300	1620	2130	volts
DC Plate Current	1.5	2.0	2.5	amp
DC Grid Current (Approx.)	0.19	0.20	0.22	amp
Driving Power (Approx.)	250	320	470	watts
Power Output (Approx.)	9200	15000	22500	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	168	184	amp
Amplification Factor	1,2	17.5	22.5	
Grid-Plate Capacitance	-	21	27.5	μμf
Grid-Filament Capacitance	-	23	31	μμf
Plate-Filament Capacitance	-	-	2	μμf
DC Grid Voltage	1,3	-480	-600	volts
DC Plate Voltage (1)	1,4	3000	4000	volts
DC Plate Voltage (2)	1,5	6700	8300	volts
Peak Cathode Current	6	11.5	-	amp
Power Output	1,7	22.5	-	kw

Note 1: With 11 volts rms on filament.

Note 2: With dc grid voltage of -100 volts and dc plate current of 1.25 amperes.

Note 3: With dc plate voltage of 10000 volts, and dc plate current of 0.020 ampere.

Note 4: With dc grid voltage of 0 volts, and dc plate current of 1.25 amperes.

Note 5: With dc grid voltage of -200 volts, and dc plate current of 1.25 amperes.

Note 6: Designers should limit the maximum useable cathode current (plate current and grid current) to this value under any condition of operation.

Note 7: In amplifier or oscillator service at a frequency of 1.6 Mc, and with dc plate voltage of 12500 volts, dc plate current of 2.6 amperes, grid resistor of 6000 ± 10% ohms, and dc grid current of 0.225 ampere.

□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

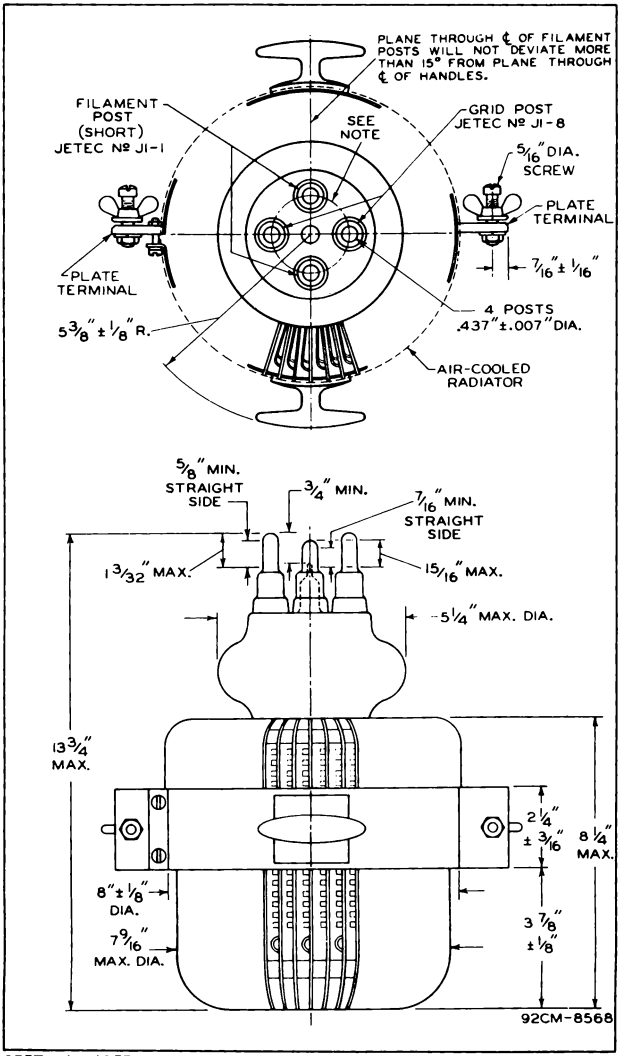
MAXIMUM RATINGS vs OPERATING FREQUENCY

FREQUENCY	25	35	50	Mc
MAX. PERMISSIBLE PERCENTAGE OF MAX. RATED PLATE VOLTAGE AND PLATE INPUT:				
Class B Telephony	100	85	70	per cent
Class C Telephony	100	80	50	per cent
Class C Telegraphy	100	80	50	per cent

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5604-A

POWER TRIODE



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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5604-A

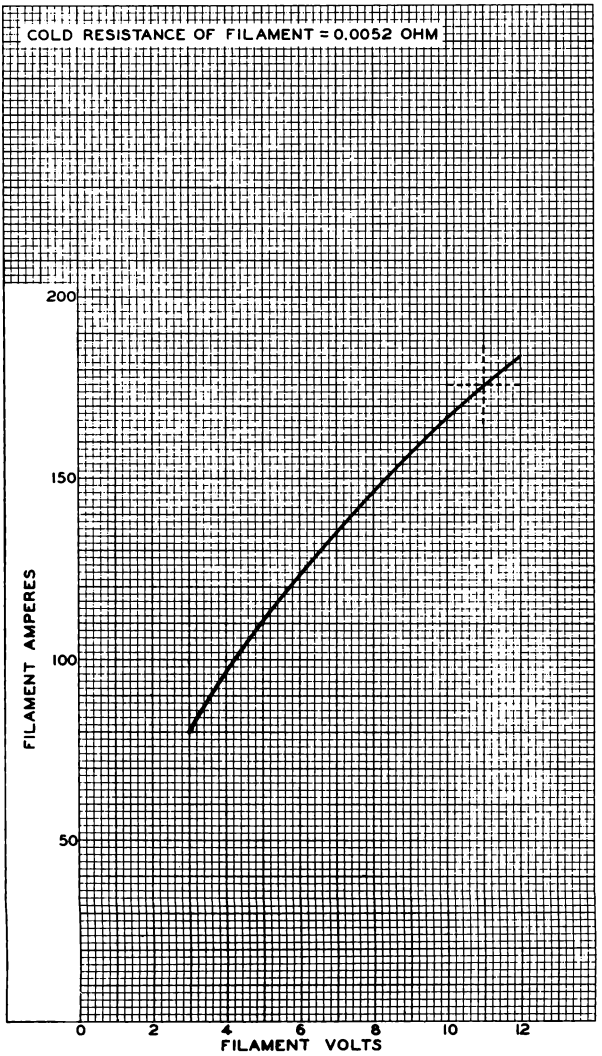
5604-A
POWER TRIODE

NOTE: ANGULAR VARIATIONS BETWEEN POSTS AND VARIATION IN POST-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT THE ENTIRE STRAIGHT-SIDE LENGTH OF THE POSTS WILL ENTER A 5/8" THICK FLAT-PLATE GAUGE HAVING 4 HOLES 0.536" ± 0.001" DIAMETER ARRANGED ON A 2.125" ± 0.001" DIAMETER CIRCLE AT ANGLES OF 90° ± 10', AND HAVING A CENTER CLEARANCE HOLE WITH DIAMETER OF 1" APPROX.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5604-A

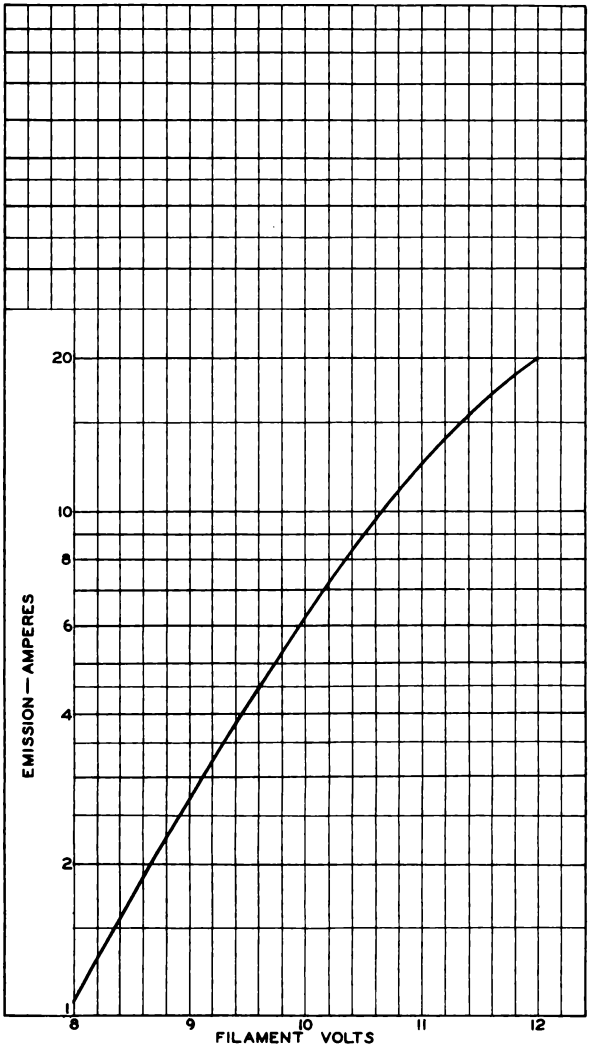
AVERAGE FILAMENT CHARACTERISTIC



5604-A

5604-A

AVERAGE FILAMENT-EMISSION CHARACTERISTIC



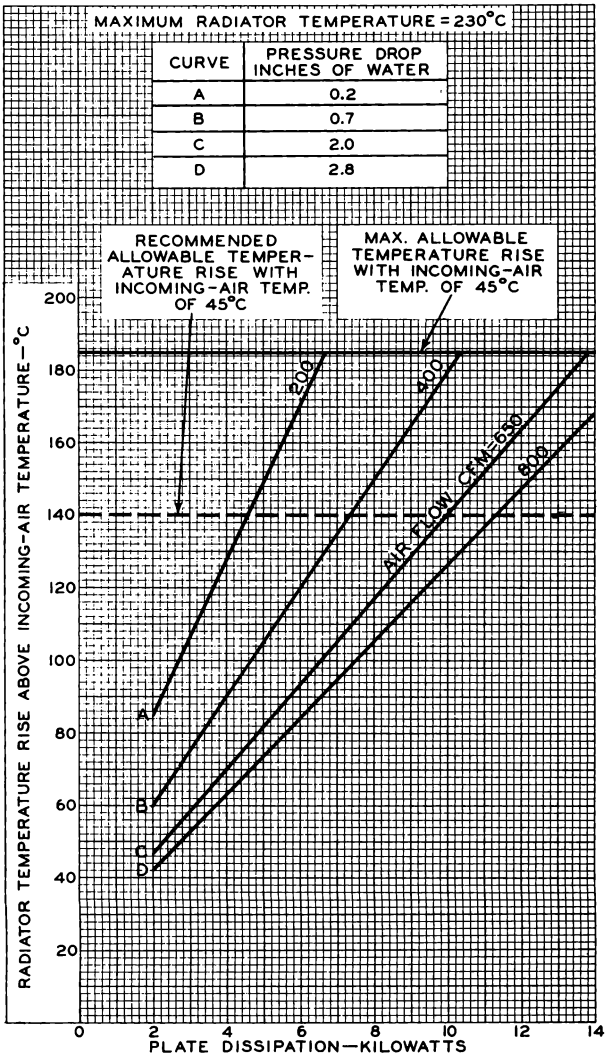
MAR. 4, 1955

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8557

5604-A

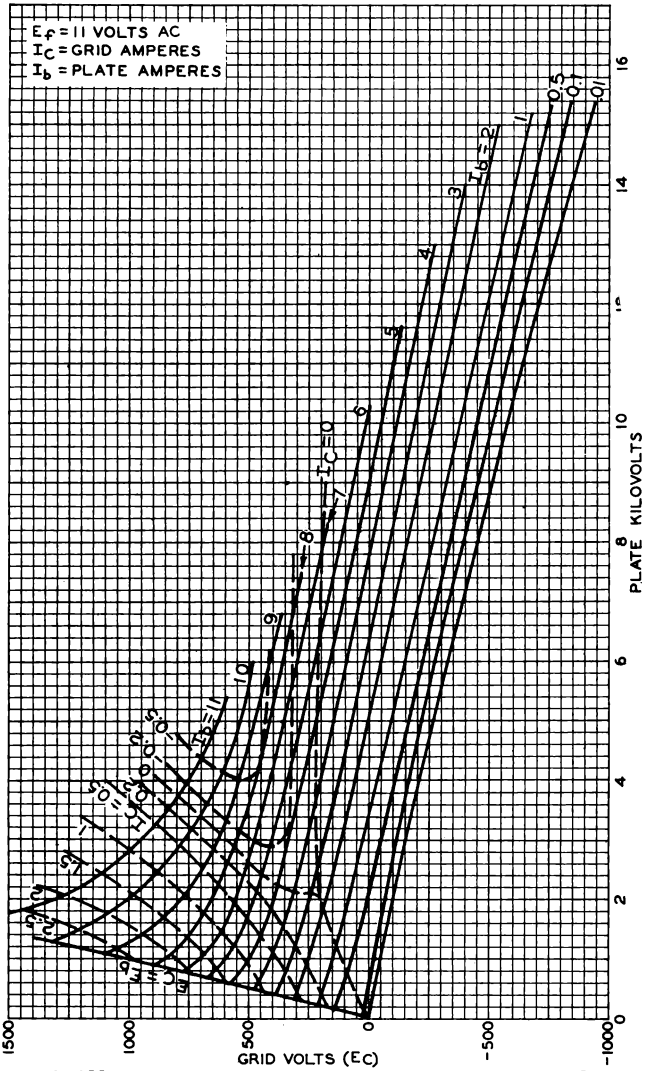
COOLING REQUIREMENTS



CURVE	PRESSURE DROP INCHES OF WATER
A	0.2
B	0.7
C	2.0
D	2.8

5604-A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



MAR. 7, 1955

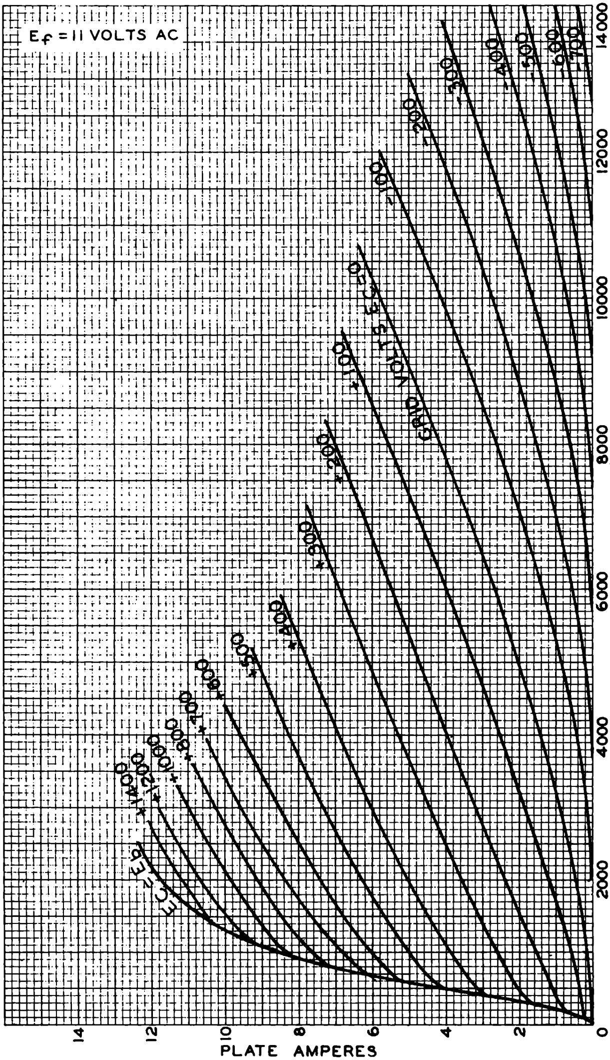
TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8558R1

5604-A

AVERAGE PLATE CHARACTERISTICS



MAR. 10, 1955

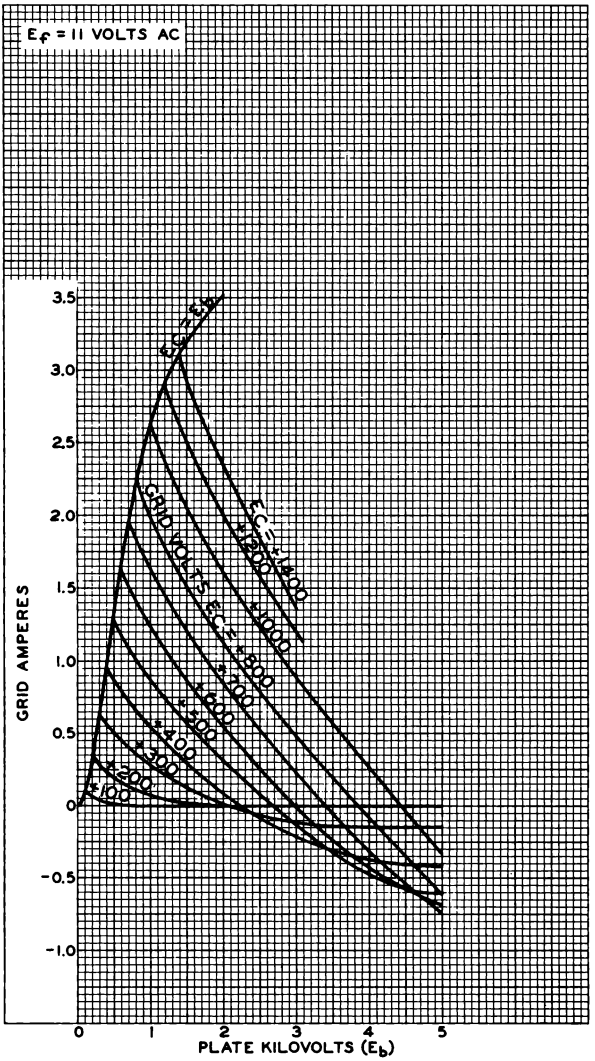
TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM - 8561

5604-A

5604-A

TYPICAL CHARACTERISTICS



5618
VHF POWER PENTODE

MINIATURE TYPE

GENERAL DATA

Electrical:

Filament, Coated:

Filament Arrangement	*Series**	*Parallel***	
Voltage	6.0 ± 10%	3.0 ± 10%	ac or dc volts
Current	0.23	0.46	amp

Direct Interelectrode Capacitances:°

Grid No.1 to Plate	0.24	μμf
Input	7.0	μμf
Output	5.0	μμf

° With no external shield.

Mechanical:

Mounting Position	Vertical, or Horizontal with pins No.1 & No.5 in a horizontal plane
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length from Base Seat to Bulb Top (excluding tip)	2" ± 3/32"
Maximum Diameter	3/4"
Bulb	T-5-1/2
Base	Small-Button Miniature 7-Pin
Basing Designation for BOTTOM VIEW	7CU

Pin 1 - Filament (-)
Pin 2 - Plate
Pin 3 - Grid No.2
Pin 4 - Grid No.3, Int. Shield

Pin 5 - Filament Mid-Tap
Pin 6 - Grid No.1
Pin 7 - Filament (+)

AF POWER AMPLIFIER & MODULATOR—Class A_1

Maximum ICAS•• Ratings, ***Absolute Values*:**

DC PLATE VOLTAGE	300 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	125 max.	volts
GRID-No.2 INPUT	2 max.	watts
PLATE DISSIPATION	5 max.	watts

Typical Operation:

Filament Arrangement	*Series**	*Parallel***	
DC Plate Voltage	250	250	volts
DC Grid-No.3 Voltage	0*	0**	volts
DC Grid-No.2 Voltage	75	75	volts
DC Grid-No.1 (Control-Grid) Voltage■	-8	-8	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	8	8	volts

*,**,••,■: See next page.

5618
VHF POWER PENTODE

Zero-Signal DC Plate Current . .	16	19	ma
Max.-Signal DC Plate Current . .	17.5	20.5	ma
Zero-Signal DC Grid-No.2 Current	1.5	2.0	ma
Max.-Signal DC Grid-No.2 Current	3.5	4.5	ma
Transconductance	3500	3600	μmhos
Effective Load Resistance (plate to plate). . .	12000	12000	ohms
Total Harmonic Distortion. . . .	10	10	%
Max.-Signal Power Output	1.2	1.4	watts

Circuit Values:

Grid-No.1-Circuit Resistance	5000 min.	ohms
	100000 max.	ohms

RF POWER AMPLIFIER & OSCILLATOR—Class C Telegraphy□□
and
RF POWER AMPLIFIER—Class C FM Telephony

Maximum ICAS●● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	300 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	125 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . . .	-125 max.	volts
DC PLATE CURRENT	30 max.	ma
DC GRID-No.1 CURRENT	3 max.	ma
PLATE INPUT.	7.5 max.	watts
GRID-No.2 INPUT.	2 max.	watts
PLATE DISSIPATION.	5 max.	watts

Typical Operation:●

	Up to 40 Mc	*At 80 Mc*	
DC Plate Voltage	300	300	volts
DC Grid-No.3 Voltage●	0	0	volts
DC Grid-No.2 Voltage□	75	75	volts
	32000	32000	ohms
DC Grid-No.1 Voltage■■ ⊕	-45	-45	volts
	30000	30000	ohms
	1400	1400	ohms
Peak RF Grid-No.1 Voltage. . . .	65	65	volts
DC Plate Current	25	25	ma
DC Grid-No.2 Current	7	7	ma
DC Grid-No.1 Current (Approx.) .	1.5	1.5	ma
Driving Power (Approx.).	0.2	0.3	watt
Power Output (Approx.) ♦ . . .	5.4	5.2	watts

Circuit Values:

Grid-No.1-Circuit Resistance	5000 min.	ohms
	100000 max.	ohms

♦ Useful power output is approximately 5.0 watts for 40 Mc and 4.5 watts for 80 Mc.

*, **, ●●, □, □□, ■, ■■, ⊕: See next page.

5618
VHF POWER PENTODE

FREQUENCY MULTIPLIER

Maximum ICAS●● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	300 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	125 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-125 max.	volts
DC PLATE CURRENT	30 max.	ma
DC GRID-No.1 CURRENT	3 max.	ma
PLATE INPUT	7.5 max.	watts
GRID-No.2 INPUT	2 max.	watts
PLATE DISSIPATION	5 max.	watts

Typical Operation:⊕

	Doubler to 80 Mc	*Tripler to 80 Mc*	
DC Plate Voltage	300	300	volts
DC Grid-No.3 Voltage⊕	0	0	volts
DC Grid-No.2 Voltage□	75	75	volts
	41000	41000	ohms
DC Grid-No.1 Voltage♦	-125	-125	volts
	68000	68000	ohms
Peak RF Grid-No.1 Voltage	160	160	volts
DC Plate Current	25	25	ma
DC Grid-No.2 Current	5.5	5.5	ma
DC Grid-No.1 Current (Approx.)	1.85	1.85	ma
Driving Power (Approx.)	0.75	0.75	watt
Power Output (Approx.)◆◆	4.2	3.4	watts

Circuit Values:

Grid-No.1-Circuit Resistance	5000 min.	ohms
	100000 max.	ohms

◆◆ Useful power output is approximately 3.5 watts for doubler service and 2.7 watts for tripler operation.

* For series filament arrangement, filament voltage is applied between pins No.1 and No.7. The grid-No.1 voltage is referred to pin No.1, and grid-No.3 (pin No.4) is connected to pin No.1.

** For parallel filament arrangement, filament voltage is applied between pin No.5 and pins No.1 and No.7 connected together. The grid-No.1 voltage is referred to pin No.5 and grid No.3 (pin No.4) is connected to pin No.5.

●● Intermittent Commercial and Amateur Service.

■ For dc filament supply.

▬ Obtained from a fixed supply or by a grid-No.1 resistor (30000) or cathode resistor (1400).

□ Obtained from a separate source, or from the plate voltage supply with a voltage divider. Series screen resistor of value shown should be used only where the 5618 is employed as a buffer amplifier and is not keyed.

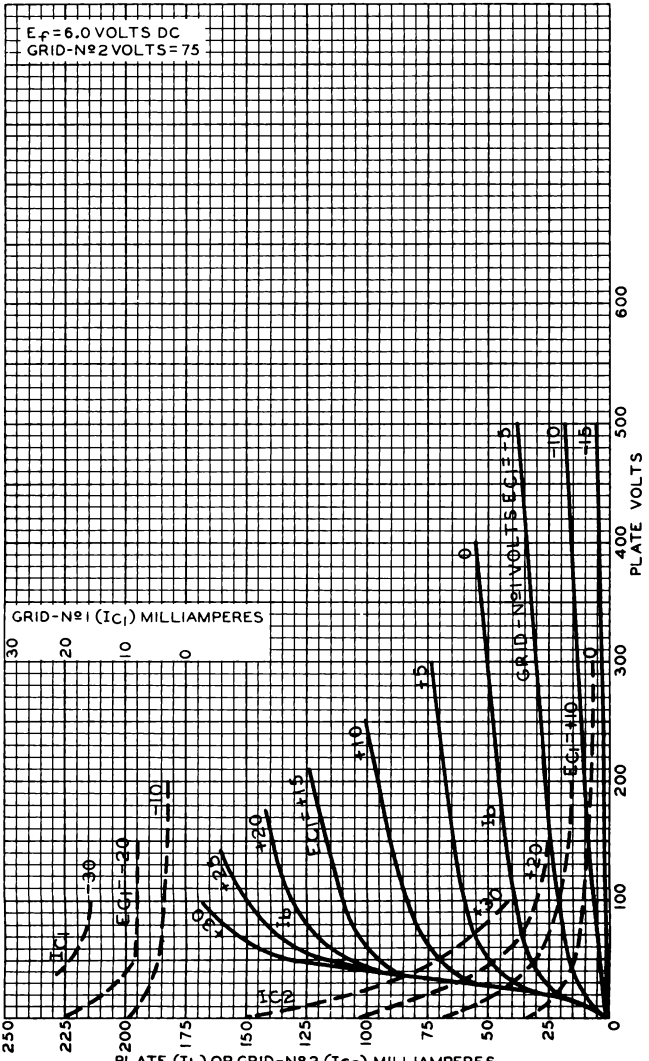
□□ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

● Filament may be connected in either parallel or series arrangement. With parallel connection, grid No.3 (pin No.4) is connected to pin No.5; for series operation, connect pin No.4 to pin No.1.

♦ Obtained from a fixed supply, or by a grid-No.1 resistor of value shown.

5618

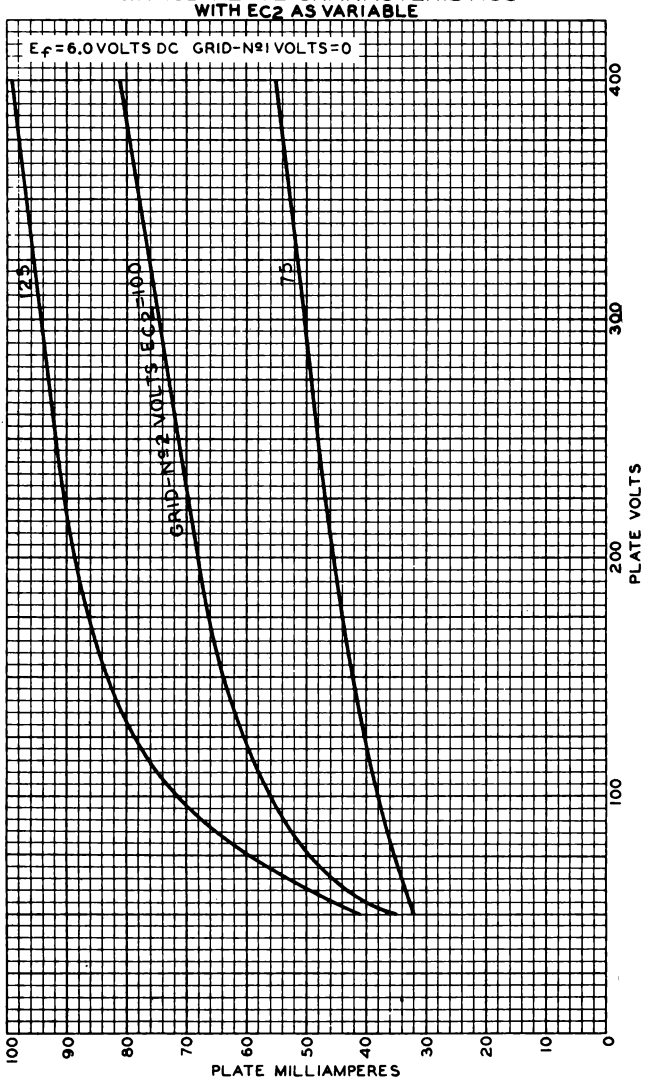
AVERAGE CHARACTERISTICS



5618

5618

AVERAGE PLATE CHARACTERISTICS
WITH EC2 AS VARIABLE



AUG. 12, 1947

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6882

5671
POWER TRIODE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

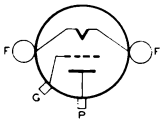
Filament, Multistrand Thoriated Tungsten:

Excitation. . . . Single Phase AC or DC		
Voltage	11▲	ac or dc volts
Current	285	amp
Starting Current:	It is not necessary to provide means for limiting filament starting current on this type. Full rated filament voltage can be applied safely to the cold filament.	←
Cold Resistance	0.005	ohms
Minimum Heating Time. .	15	seconds
Amplification Factor. . .	39	
Direct Interlectrode Capacitances (Approx.):		
Grid to Plate	52	μμf
Grid to Filament . . .	88	μμf
Plate to Filament . . .	1.5	μμf

Mechanical:

Terminal Connections:

F - Filament
G - Grid-Flange Terminal



P - Radiator-Cooled Plate Terminal

Mounting Position	Vertical, Filament End Up
Maximum Overall Length.	25"
Maximum Diameter.	16-15/16"
Radiator	Integral Part of Tube
Air Jacket.	RCA MI-28190

Air Flow:

Through Radiator - The specified air flow for various plate dissipations, as indicated in the tabulation below, should be delivered by a blower vertically upward through the radiator before and during the application of any voltages. Filament power, plate power, and air may be removed simultaneously.

Plate Dissipation . . .	15	20	25	kw
Air Flow.	1100	1450	1800	cfm
Static Pressure	0.85	1.5	2.2	in. of water

To Filament Seals . . . . . 10 min. cfm

The specified air flow should be directed from a 1-1/4" diameter nozzle into the filament header before and during the application of any voltages in order to limit the temperature of the filament seals to the maximum value.

Input Air Temperature (To Radiator)	45 max.	°C
Radiator Temperature (Measured at core, upper end, away from incoming air). . . .	180 max.	°C
Bulb Temperature.	180 max.	°C
Seal Temperature (Filament, grid, plate). . .	165 max.	°C

▲ When the 5671 is operated at less than maximum ratings, the filament voltage may be reduced, the amount depending on operating conditions. The filament voltage range is from 9.75 volts to 11.5 volts.

← Indicates a change.

5671
POWER TRIODE

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	15000	max.	volts
MAX.-SIGNAL DC PLATE CUR.*	6	max.	amp
MAX.-SIGNAL PLATE INPUT*	90	max.	kw
PLATE DISSIPATION*	25	max.	kw

Typical Operation:

Values are for 2 tubes

Filament Voltage	10	11	volts
DC Plate Voltage	10200	15000	volts
DC Grid Voltage	-220	-320	volts
Peak AF Grid-to-Grid Voltage	900	1600	volts
Zero-Signal DC Plate Current	0.6	0.6	amp
Max.-Signal DC Plate Current	5.8	10	amp
Effective Load Resistance (Plate-to-plate)	3600	3320	ohms
Max.-Signal Driving Power (Approx.)#	120	600	watts
Max.-Signal Power Output (Approx.)	37	100	kw

* Averaged over any audio-frequency cycle of sine-wave form.

\# The driving stage should have good regulation and should be capable of supplying considerably more than the specified driving power.

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube-for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	12500	max.	volts
DC GRID VOLTAGE	-2000	max.	volts
DC PLATE CURRENT	4.5	max.	amp
DC GRID CURRENT	1	max.	amp
PLATE INPUT	55	max.	kw
PLATE DISSIPATION	17	max.	kw

Typical Operation:

Filament Voltage	10	11	volts
DC Plate Voltage	10200	12500	volts
DC Grid Voltage●	-1500	-1500	volts
	2100	1500	ohms
Peak RF Grid Voltage	2070	2180	volts
DC Plate Current	3.3	4	amp
DC Grid Current (Approx.)□	0.72	1	amp
Driving Power (Approx.)□	1350	1960	watts
Power Output (Approx.)	28	40	kw

●, #, □: See next page.

5671
POWER TRIODE

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	15000	max.	volts
DC GRID VOLTAGE	-2000	max.	volts
DC PLATE CURRENT	8	max.	amp
DC GRID CURRENT	1	max.	amp
PLATE INPUT	100	max.	kw
PLATE DISSIPATION	25	max.	kw

Typical Operation:

Filament Voltage	10	11	volts
DC Plate Voltage	12500	15000	volts
DC Grid Voltage▲	-1250	-1500	volts
	190	225	ohms
	1300	1500	ohms
Peak RF Grid Voltage	1970	2270	volts
DC Plate Current	5.8	6	amp
DC Grid Current (Approx.)□	0.95	1	amp
Driving Power (Approx.)□	1700	2040	watts
Power Output (Approx.)	55	70	kw

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	265	305	amp
Amplification Factor	1,2	34	44	
Grid-Plate Capacitance	–	45	59	μμf
Grid-Filament Capacitance	–	72	104	μμf
Plate-Filament Capacitance	–	1.1	1.9	μμf
Plate Voltage	1,3	3600	4600	volts
Plate Voltage	1,4	7000	9000	volts
Grid Voltage	1,5	-310	-490	volts
Grid Voltage	1,6	–	1100	volts
Peak Cathode Current	7	50	–	amp
Grid Current	1,6	–	9.5	amp
Useful Power Output	1,8	59000	–	watts ←

Note 1: With 11 volts ac on filament.

Note 2: With dc grid voltage of -50 volts and dc plate voltage adjusted to give dc plate current of 2 amp.

Note 3: With dc grid voltage of 0 volts, and dc plate voltage adjusted to give dc plate current of 2 amp.

Note 4: With dc grid voltage of -100 volts, and dc plate voltage adjusted to give dc plate current of 2 amp.

Note 5: With dc plate voltage of 15000 volts, and dc grid voltage adjusted to give dc plate current of 50 ma.

Note 6: With dc plate voltage of 2600 volts, and instantaneous grid voltage adjusted to give instantaneous plate current of 35 amp.

●, ●, □, □□, ▲: See next page. ←Indicates a change.

5671

POWER TRIODE

Note 7: Represents the maximum usable cathode current (plate current and grid current) for the tube under any condition of operation.

Note 8: In self-excited oscillator circuit and with dc plate voltage of 15000 volts, dc plate current of 6.6 amp., dc grid current of 0.8 to 1.0 amp., grid resistor of 1000 ± 10% ohms, and frequency of 1.6 megacycles per second.

● Continuous commercial service.

◉ Obtained by grid resistor of value shown or by partial self-bias methods.

□ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

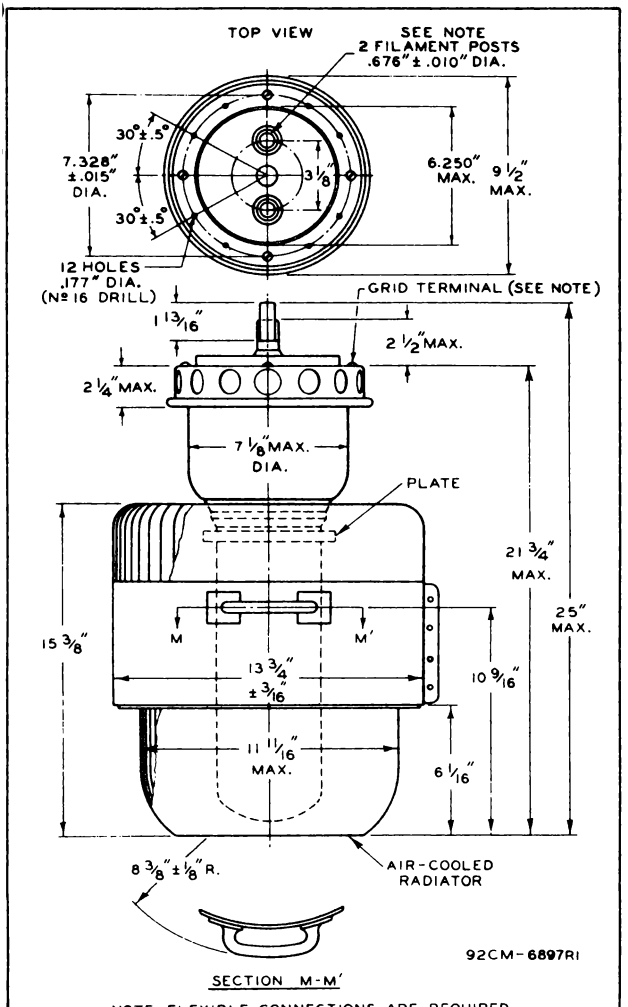
▲ Obtained by cathode resistor (190,225), grid resistor, (1300,1500), or partial self-bias methods.

Data on operating frequencies for the 5671 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5671

POWER TRIODE



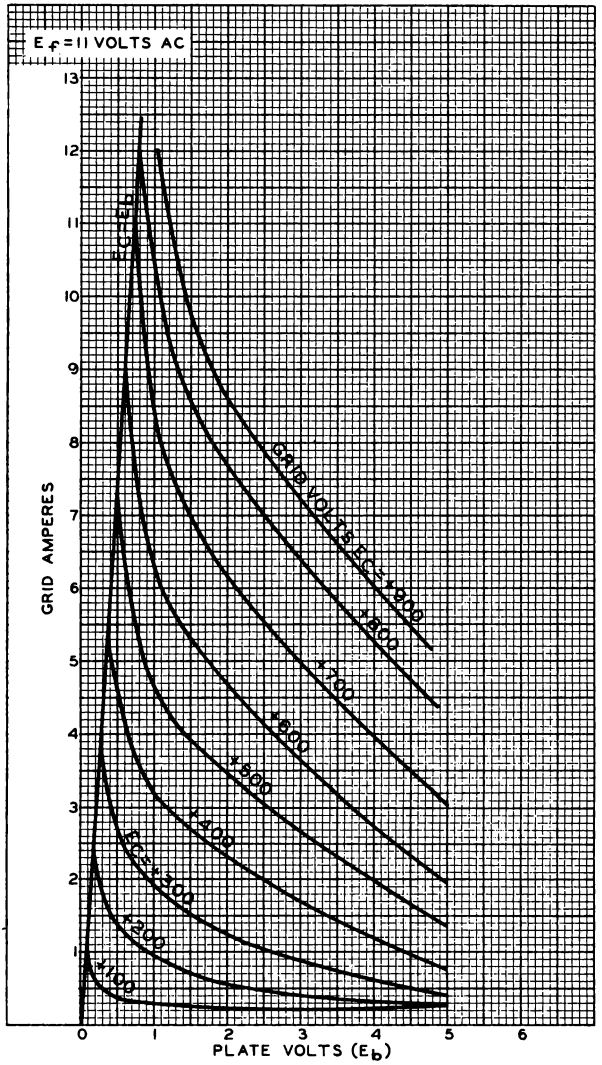
NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5671

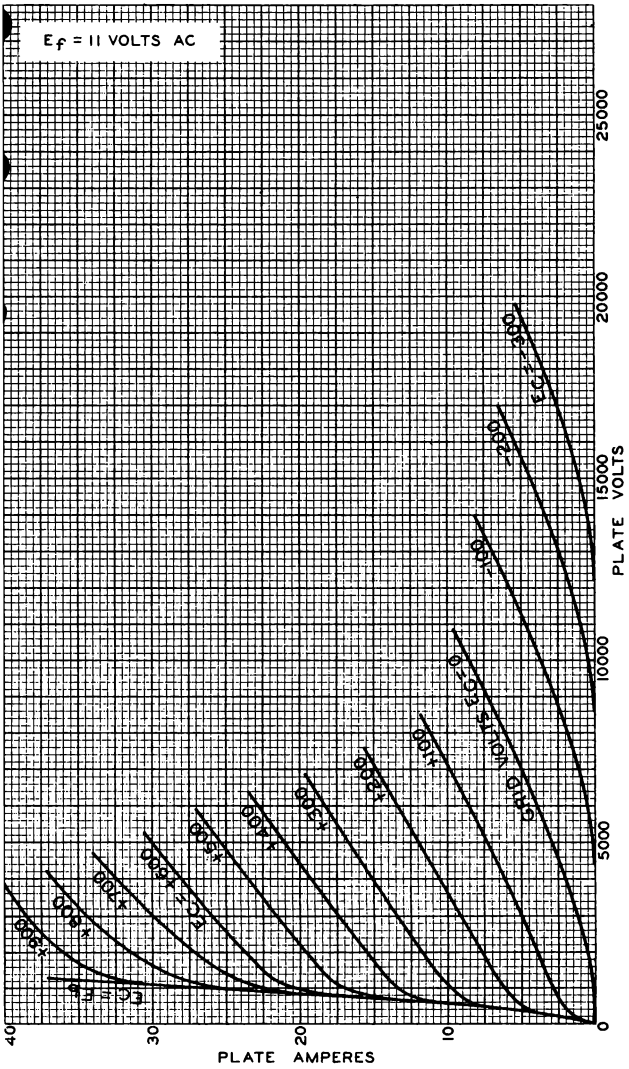
5671

TYPICAL CHARACTERISTICS



5671

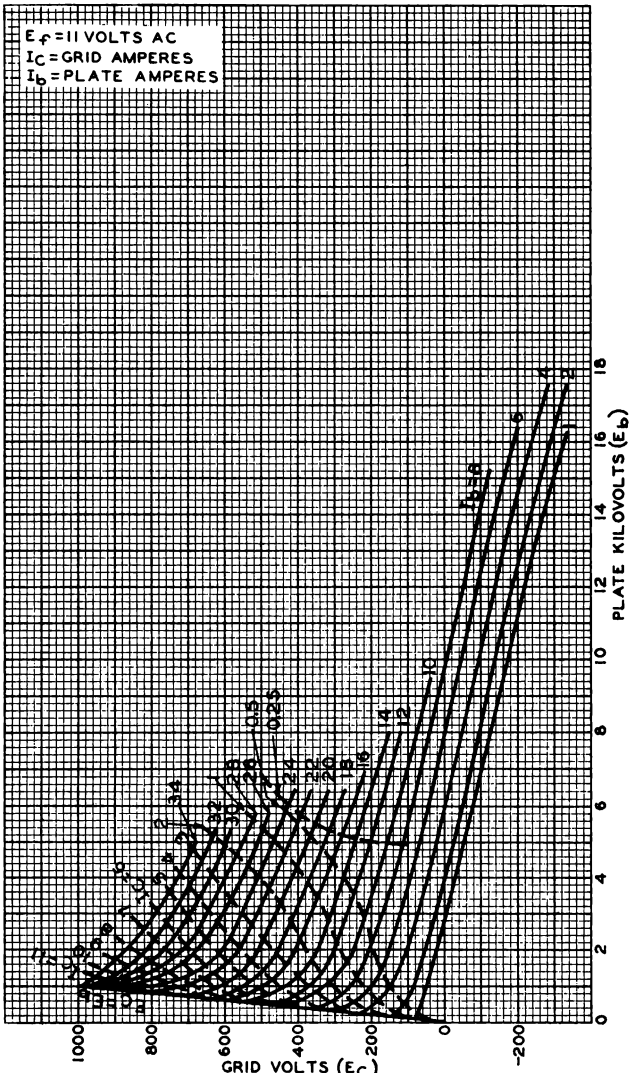
AVERAGE PLATE CHARACTERISTICS



5671

5671

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



NOV. 19, 1947

TUBE DEPARTMENT

92CM-6909

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5713

POWER TRIODE

FORCED-AIR-COOLED, GROUNDED-GRID TYPE

GENERAL DATA

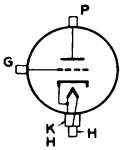
Electrical:

Heater, for Unipotential Cathode:		
Voltage	3.3 ± 0.2	ac or dc volts
Current	11.5	amp
Minimum Heating Time▲	2	minutes
Amplification Factor	25	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	10.3	μμf
Grid to Cathode	26	μμf
Plate to Cathode	0.5	μμf

Mechanical:

Terminal Connections:

H: Heater
G: Grid Terminal (Flange)



K: Cathode
P: Plate Terminal (Radiator)

Mounting Position	Vertical, with radiator up or down
Overall Length	4-25/32" ± 3/32"
Greatest Diameter	2.056" ± 0.006"
Radiator	Integral Part of Tube

Air Flow:

Through Radiator – The specified air flow for various plate dissipations, as indicated in the tabulation below, should be delivered through the radiator toward the bulb before and during the application of any voltages.

Plate Dissipation	150	200	250	watts
Air Flow	9	13	18	cfm
Static Pressure	0.14	0.27	0.45	in. of water

Incoming Air Temperature	45 max.	°C
Radiator Temperature (Measured on the core at end away from incoming air)	180 max.	°C
Glass Temperature	180 max.	°C
Grid-Terminal Temperature	140 max.	°C

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	1500 max.	volts
DC GRID VOLTAGE	-250 max.	volts
DC PLATE CURRENT	300 max.	ma
DC GRID CURRENT	50 max.	ma
PLATE INPUT	450 max.	watts
PLATE DISSIPATION	250 max.	watts

▲ With 3.3 volts on heater. This time may be shortened by increasing the heater voltage during the interval required for the cathode to reach normal operating temperature. Increasing the heater voltage to 4 volts reduces the heating time to 1 minute, while 5 volts reduces it to 40 seconds. After this heating interval, the heater voltage must be reduced to 3.3 volts.

● Continuous Commercial Service.

5713
POWER TRIODE

Typical Operation in Grounded-Cathode Circuit:

DC Plate Voltage	1500	volts
DC Grid Voltage*	-175	volts
	510	ohms
Peak RF Grid Voltage	210	volts
DC Plate Current	300	ma
DC Grid Current (Approx.)	40	ma
Driving Power (Approx.)	8	watts
Power Output (Approx.)	290	watts

Typical Operation in Grounded-Grid Circuit at 220 Mc:

Same values as for Grounded-Cathode Circuit with the following exceptions:

Driving Power (Approx.)#	65	watts
Power Output (Approx.)	325	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	10.8	12.2	amp
Amplification Factor	1,2	19	29	
Grid-Plate Capacitance	-	9	11.6	μμf
Grid-Cathode Capacitance	-	23	29	μμf
Plate-Cathode Capacitance	-	0.39	0.65	μμf
Grid Voltage	1,3	-	-90	volts
Grid Voltage	1,4	-41	-70	volts
Peak Cathode Current	1,5	40	-	amp
Power Output	1,6	290	-	watts

Note 1: Heater volts = 3.3.

Note 2: With 1000 volts on plate, and plate ma. = 150.

Note 3: With 1500 volts on plate and plate ma. = 20.

Note 4: With 1500 volts on plate and plate ma. = 150.

Note 5: Represents maximum usable cathode current (plate current plus grid current) for tube, for any condition of operation.

Note 6: With 1500 volts on plate, plate ma. = 350, grid ma. = 50 to 60, grid resistor of 4000 ± 10% ohms, and frequency of 20 Mc.

Required by tube and input circuit. A portion of this power appears in the load circuit.

* Obtained from fixed supply or from a cathode resistor of value shown.

Data on operating frequencies for the 5713 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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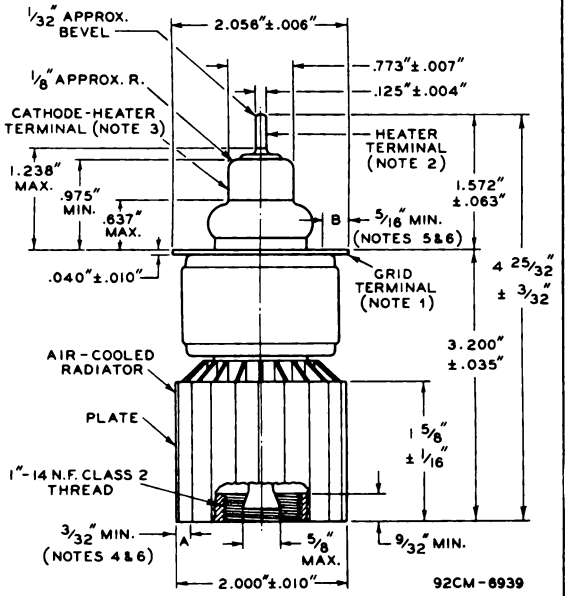
POWER TRIODE



NOTE 1: MAXIMUM ECCENTRICITY OF ℄ (AXIS) OF GRID-TERMINAL FLANGE WITH RESPECT TO ℄ (AXIS) OF PLATE RADIATOR IS 0.040", MEASURED WITHIN 1/32" OF BOTTOM OF RADIATOR.

NOTE 2: MAXIMUM ECCENTRICITY OF ℄ (AXIS) OF HEATER TERMINAL WITH RESPECT TO ℄ (AXIS) OF CATHODE-HEATER TERMINAL IS 0.020".

NOTE 3: MAXIMUM ECCENTRICITY OF ℄ (AXIS) OF CATHODE-HEATER TERMINAL WITH RESPECT TO ℄ (AXIS) OF GRID-TERMINAL FLANGE IS 0.020".

NOTE 4: SURFACE OF ANNULAR AREA INDICATED BY "A" ON BOTTOM OF RADIATOR IS IN SAME PLANE WITHIN 0.005", AS DETERMINED BY GAUGE 1/16" WIDE AND 0.005" THICK. THIS GAUGE WILL NOT ENTER MORE THAN 1/16" WITH BOTTOM OF RADIATOR RESTING ON FLAT PLATE.

NOTE 5: SURFACE OF ANNULAR AREA INDICATED BY "B" ON GRID-TERMINAL FLANGE IS IN SAME PLANE WITHIN 0.008", AS DETERMINED BY GAUGE METHOD DESCRIBED IN NOTE 4.

NOTE 6: SURFACE OF ANNULAR AREA INDICATED BY "A" ON BOTTOM OF RADIATOR IS PARALLEL WITHIN 0.030" TO SURFACE OF ANNULAR AREA INDICATED BY "B" ON GRID-TERMINAL FLANGE.

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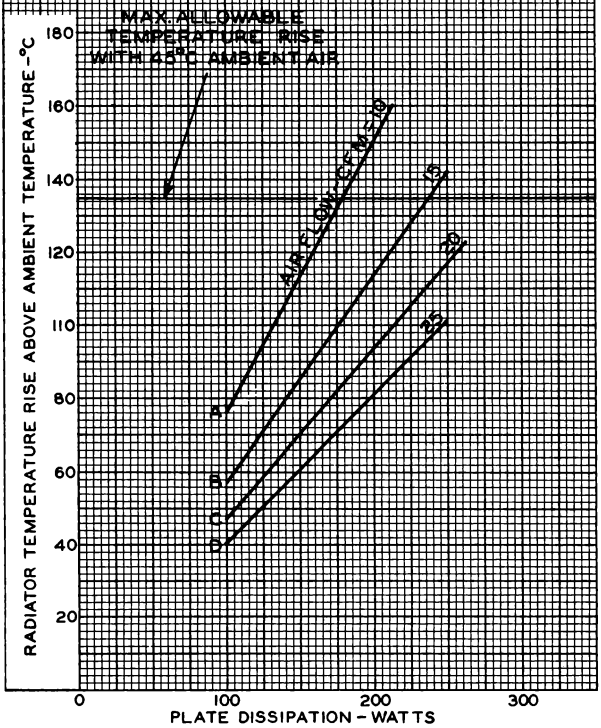
COOLING REQUIREMENTS

E_f = 3.3 VOLTS MAXIMUM RADIATOR TEMPERATURE = 180°C

CURVE	PRESSURE DROP INCHES OF WATER
A	0.17
B	0.33
C	0.55
D	0.82

CURVES TAKEN ACCORDING TO NAFM* STANDARDS - BULLETIN Nº 103

*NATIONAL ASSOCIATION OF FAN MFRS., GENERAL MOTORS BLDG., DETROIT, MICH.



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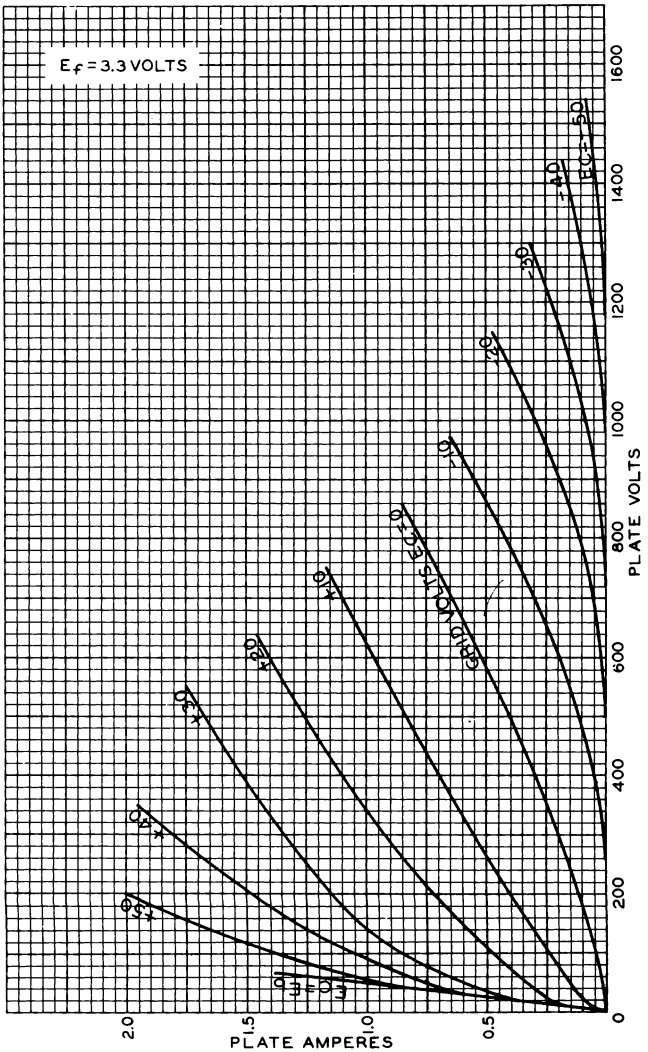
AVERAGE PLATE CHARACTERISTICS



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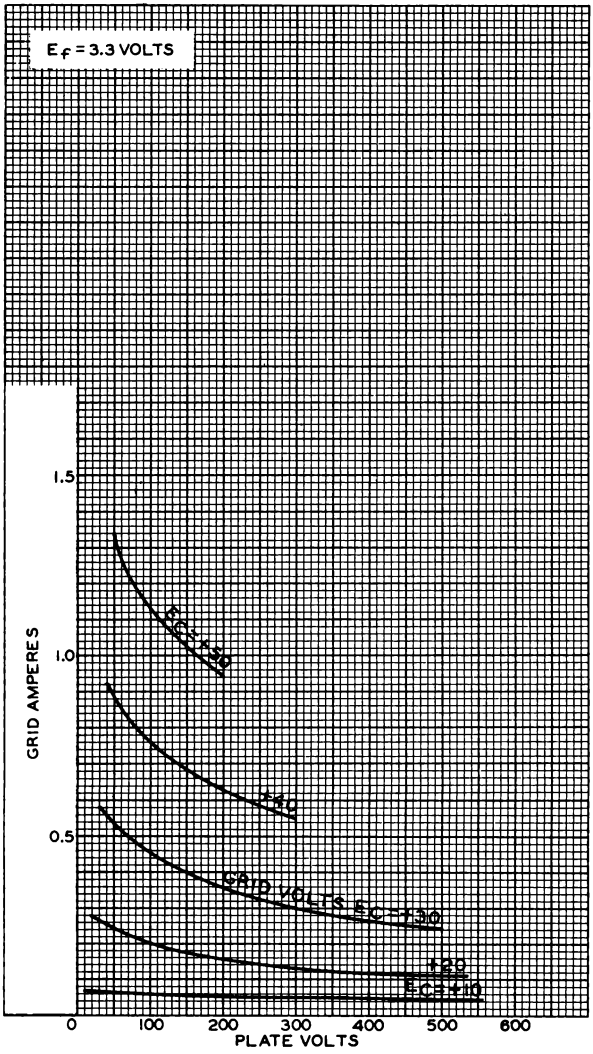
TYPICAL GRID CHARACTERISTICS



MAR. 18, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6941

5762/7C24
POWER TRIODE

FORCED-AIR COOLED, RF GROUNDED-GRID TYPE

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:

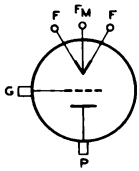
Voltage	12.6 ± 0.6	ac or dc volts
Current	29	amp
Starting Current: The filament current must never exceed 175 amperes, even momentarily		
Cold Resistance	0.052	ohm
Amplification Factor	29	
Direct Interelectrode Capacitances:		
Grid to Plate	18.5	μμf
Grid to Filament	19	μμf
Plate to Filament	0.5	μμf

Mechanical:

Terminal Connections:

F - Filament

FM - Filament Mid-Tap



G - Grid Terminal (Flange)

P - Plate Terminal (Radiator)

Mounting Position	Vertical, filament end up or down
Maximum Overall Length (Excluding flexible leads)	7-1/8"
Maximum Diameter	4-11/16"
Radiator	Integral Part of Tube

Air Flow:

Through Radiator:

The specified flow of incoming air at a temperature of 45°C for various plate dissipations, as indicated in the tabulation below, should be delivered by a blower through the radiator before and during the application of any voltages. Filament power, plate power, and air may be removed simultaneously.

Percentage of Max. Rated Plate Dissipation for Each Class of Service	100	80	60	per cent
Minimum Air Flow	190	125	75	cfm
Static Pressure	1.21	0.58	0.26	in. of water

To Header and Filament Seals . . . . . 10 min. cfm

The specified air flow from a 1"-diameter nozzle should be directed into the filament header before and during the application of any voltages in order to limit the temperature of the filament seals and the grid seal to their maximum value.

Incoming Air Temperature	45 max.	°C
Radiator Temperature (Measured on the core at end away from incoming air)	180 max.	°C
Bulb Temperature (At hottest part)	180 max.	°C
Seal Temperature:		
Filament, Grid, and Plate	180 max.	°C

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POWER TRIODE

Fittings:

For use with 5762/7C24 when operated at frequencies up to about 60 Mc. At higher frequencies, cavity-type circuits with special built-in fittings are utilized.

Air Jacket	RCA-229F1
Air Manifold	RCA-230F1
Bracelet	RCA-231F1

AF POWER AMPLIFIER & MODULATOR--Class B

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	6200 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	1.5 max.	amp
MAX.-SIGNAL PLATE INPUT*	8700 max.	watts
PLATE DISSIPATION*	3000 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	4700	volts
DC Grid Voltage	-200	volts
Peak AF Grid-to-Grid Voltage	900	volts
Zero-Signal DC Plate Current	0.3	amp
Max.-Signal DC Plate Current	2.8	amp
Effective Load Resistance (Plate to plate)	3640	ohms
Max.-Signal Driving Power (Approx.)	195	watts
Max.-Signal Power Output (Approx.)	8800	watts

RF POWER AMPLIFIER--Class B Television Service

Synchronizing-level conditions unless otherwise specified

Maximum CCS● Ratings, *Absolute Values:*

	54 to 216 Mc	
DC PLATE VOLTAGE	3700 max.	volts
DC PLATE CURRENT	1.9 max.	amp
DC GRID CURRENT (Pedestal Level)	0.225 max.	amp
PLATE INPUT	6500 max.	watts
PLATE DISSIPATION	3000 max.	watts

Typical Operation in RF Grounded-Grid Circuit:

Bandwidth▲ of	*10 Mc*	*8.5 Mc*	
DC Plate Voltage	3000	3200	volts
DC Grid Voltage	-105	-110	volts
Peak RF Grid Voltage:			
Synchronizing Level	380	435	volts
Pedestal Level	290	310	volts
DC Plate Current:			
Synchronizing Level	1.8	1.8	amp
Pedestal Level	1.36	1.35	amp

* Averaged over any audio-frequency cycle of sine-wave form.

●,▲,: See next page.

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POWER TRIODE

	Bandwidth▲ of 10 Mc	*8.5 Mc*	
DC Grid Current:			
Synchronizing Level	0.265	0.400	amp
Pedestal Level	0.115	0.130	amp
Driving Power (Approx.):#			
Synchronizing Level	625	770	watts
Power Output (Approx.):			
Synchronizing Level	3150	4000	watts
Pedestal Level	1800	2300	watts

GRID-MODULATED RF POWER AMPLIFIER--Class C Television Service

Synchronizing-level conditions unless otherwise specified

Maximum CCS● Ratings, *Absolute Values:*

	54 to 216 Mc	
DC PLATE VOLTAGE	3700 max.	volts
DC GRID VOLTAGE (White Level)	-800 max.	volts
DC PLATE CURRENT	1.9 max.	amp
DC GRID CURRENT (Pedestal Level)	0.225 max.	amp
PLATE INPUT	6500 max.	watts
PLATE DISSIPATION	3000 max.	watts

Typical Operation in RF Grounded-Grid Circuit:

	Bandwidth▲ of 8.5 Mc	
DC Plate Voltage	3200	volts
DC Grid Voltage:		
Synchronizing Level	-110	volts
Pedestal Level	-220	volts
White Level	-520	volts
Peak RF Grid Voltage	435	volts
DC Plate Current:		
Synchronizing Level	1.8	amp
Pedestal Level	1.25	amp
DC Grid Current (Approx.):		
Synchronizing Level	0.400	amp
Pedestal Level	0.130	amp
Driving Power (Approx.):#		
Synchronizing Level	770	watts
Power Output (Approx.):		
Synchronizing Level	4000	watts
Pedestal Level	2300	watts

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*□

DC PLATE VOLTAGE	5000 max.	volts

▲ Computed between half-power points and based on tube output capacitance only.

Computed value to supply grid losses and feed-through power. Additional power will be required to supply circuit losses.

●, □, See next page.

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POWER TRIODE

DC GRID VOLTAGE**	−1000 max.	volts
DC PLATE CURRENT	1 max.	amp
DC GRID CURRENT**	0.3 max.	amp
PLATE INPUT	5000 max.	watts
PLATE DISSIPATION	2000 max.	watts

Typical Operation in Grounded-Filament Circuit:

	Up to 30 Mc	*At 110 Mc*	
DC Plate Voltage	4700	4000	volts
DC Grid Voltage	−400	−350	volts
From a grid resistor of	1425	1460	ohms
Peak RF Grid Voltage°	675	600	volts
DC Plate Current	0.96	0.93	amp
DC Grid Current (Approx.)□□	0.28	0.24	amp
Driving Power (Approx.)□□	170	130	watts
Power Output (Approx.)	3700	2800	watts

Typical Operation in RF Grounded-Grid Circuit:

DC Plate Voltage	4700	4000	volts
DC Grid Voltage	−400	−350	volts
From a grid resistor of	1425	1460	ohms
Peak RF Grid Voltage	675	600	volts
DC Plate Current	0.96	0.93	amp
DC Grid Current (Approx.)□□	0.28	0.24	amp
Driving Power (Approx.)□□●	720	600	watts
Power Output (Approx.)	4200	3200	watts

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy▲▲ and RF POWER AMPLIFIER--Class C FM Telephony

Maximum CCS● Ratings, ***Absolute Values:***□

DC PLATE VOLTAGE	6200 max.	volts
DC GRID VOLTAGE**	−1000 max.	volts
DC PLATE CURRENT	1.4 max.	amp
DC GRID CURRENT**	0.3 max.	amp
PLATE INPUT	8700 max.	watts
PLATE DISSIPATION	3000 max.	watts

Typical Operation in Grounded-Filament Circuit:

	Up to 30 Mc	
DC Plate Voltage	6000	volts
DC Grid Voltage:		
From a fixed supply of	−550	volts
From a grid resistor of	1900	ohms
From a cathode resistor of	360	ohms

° Driver modulated approximately 30%.

□ Carrier power of driver modulated 100%.

▲▲ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●, □, **, □□: See next page.

5762/7C24

POWER TRIODE

	Up to 30 Mc	
Peak RF Grid Voltage	875	volts
DC Plate Current	1.25	amp
DC Grid Current (Approx.)□□	0.290	amp
Driving Power (Approx.)□□	225	watts
Power Output (Approx.)	6000	watts

Typical Operation in RF Grounded-Grid Circuit:

	Up to 30 Mc	At 110 Mc	At 220 Mc	
DC Plate Voltage	6000	5000	3000	volts
DC Grid Voltage:				
From a fixed supply of	-550	-1000	-160	volts
From a grid resistor of	1900	4100	670	ohms
From a cathode resistor of	360	740	110	ohms
Peak RF Grid Voltage	875	1350	410	volts
DC Plate Current	1.25	1.1	1.25	amp
DC Grid Current (Approx.)□□	0.290	0.245	0.240	amp
Driving Power (Approx.)□□	1225	1680	510	watts
Power Output (Approx.)	7000	5500	2650	watts

SELF-RECTIFYING OSCILLATOR or AMPLIFIER--Class C

Maximum CCS● Ratings, *Absolute Values:*□

AC PLATE VOLTAGE (RMS)	7000 max.	volts
DC GRID VOLTAGE**	-300 max.	volts
DC PLATE CURRENT	0.635 max.	amp
DC GRID CURRENT**	0.135 max.	amp
PLATE INPUT†	4900 max.	watts
PLATE DISSIPATION	3000 max.	watts

Typical Operation

AC Plate Voltage (RMS)	6600	volts
DC Grid Voltage	-127	volts
DC Plate Current	0.625	amp
DC Grid Current (Approx.)□□	0.105	amp
Driving Power (Approx.) ♦□□	60	watts
Power Output (Approx.)	3350	watts

AMPLIFIER or OSCILLATOR--Class C

With separate, rectified, unfiltered, single-phase, full-wave plate supply

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	5600 max.	volts

† Plate input is 1.11 times the product of the ac voltage (rms) and the dc plate current.

♦ From a self-rectified driver.

□ These ratings hold for operation up to 30 Mc. For ratings at higher frequencies, see RATINGS vs FREQUENCY on next sheet.

●,**,□□: See next page.

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5762/7C24
POWER TRIODE

DC GRID VOLTAGE**	-600 max.	volts
DC PLATE CURRENT	1.25 max.	amp
DC GRID CURRENT**	0.270 max.	amp
PLATE INPUT ††	8600 max.	watts
PLATE DISSIPATION	3000 max.	watts

Typical Operation:

DC Plate Voltage	5000	volts
DC Grid Voltage	-260	volts
DC Plate Current	1.2	amp
DC Grid Current (Approx.)□□	0.260	amp
Driving Power (Approx.)♦□□	150	watts
Power Output (Approx.)	5650	watts

● Continuous Commercial Service.

** See RATINGS vs FREQUENCY—*Max. Permissible Percentage of Max. Rated DC Grid Voltage and DC Grid Current* on next page.

□□ For effect of load resistance on grid current and driving power, refer to TUBE RATINGS--*Grid Current and Driving Power* in the General Section.

†† Plate input is 1.23 times the product of the dc plate voltage and the dc plate current.

♦ From a driver with a rectified, unfiltered, single-phase, full-wave plate supply.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	27	31	amp
Amplification Factor	1,2	25	33	
Grid-Plate Capacitance	-	16.5	20.5	μμf
Grid-Filament Capacitance	-	15.5	22.5	μμf
Plate-Filament Capacitance	-	0.38	0.62	μμf
Grid Voltage	1,3	-125	-190	volts
Plate Voltage	1,4	1350	1750	volts
Plate Voltage	1,5	2600	3400	volts
Peak Cathode Current	6	10	-	amp
Useful Power Output	1,7	3	-	kw

Note 1: With 12.6 volts rms on filament.

Note 2: With dc grid voltage of -25 volts measured from center tap of filament supply, and dc plate voltage adjusted to give dc plate current of 0.5 ampere.

Note 3: With dc plate voltage of 4000 volts, and dc grid voltage adjusted to give dc plate current of 0.05 ampere.

Note 4: With dc grid voltage of 0 volts measured from center tap of filament supply, and dc plate voltage adjusted to give dc plate current of 0.5 ampere.

5762/7C24

POWER TRIODE

Note 5: With dc grid voltage of -50 volts measured from center tap of filament supply, and dc plate voltage adjusted to give dc plate current of 0.5 ampere.

Note 6: Designers should limit the maximum useable cathode current (plate current and grid current) to this value under any condition of operation.

Note 7: In a self-excited, coaxial, oscillator circuit and with dc plate voltage of 5000 volts, dc plate current of 1.1 amperes, grid resistor of 1500 ± 10% ohms, dc grid current of 0.250 to 0.300 ampere, and frequency of 110 Mc.

RATINGS vs FREQUENCY

FREQUENCY	30	110	220		Mc
MAX. PERMISSIBLE PERCENTAGE OF MAX. RATED PLATE VOLTAGE AND PLATE INPUT:					
Class B Television Service	Full Ratings--54 to 216 Mc				
Class C Television Service	Full Ratings--54 to 216 Mc				
Class C Telephony, Plate Modulated	100	84	52		per cent
Class C Telegraphy and FM Telephony	100	84	52		per cent
Class C Amplifier or Osc., Self-Rectifying	100	84	52		per cent
Class C Amplifier or Osc. with Separate, Rectified, Unfiltered Plate Supply	100	84	52		per cent
MAX. PERMISSIBLE PERCENTAGE OF MAX. RATED DC GRID VOLTAGE AND DC GRID CURRENT:					
Class B Television Service	Full Ratings--54 to 216 Mc				
Class C Television Service	Full Ratings--54 to 216 Mc				
			Volt.	*Cur.*	
Class C Telephony, Plate-Modulated	100	100	60	83	per cent
Class C Telegraphy and FM Telephony	100	100	60	83	per cent
Class C Amplifier or Osc., Self-Rectifying	100	100	60	83	per cent
Class C Amplifier or Osc. with Separate, Rectified, Unfiltered Plate Supply	100	100	60	83	per cent

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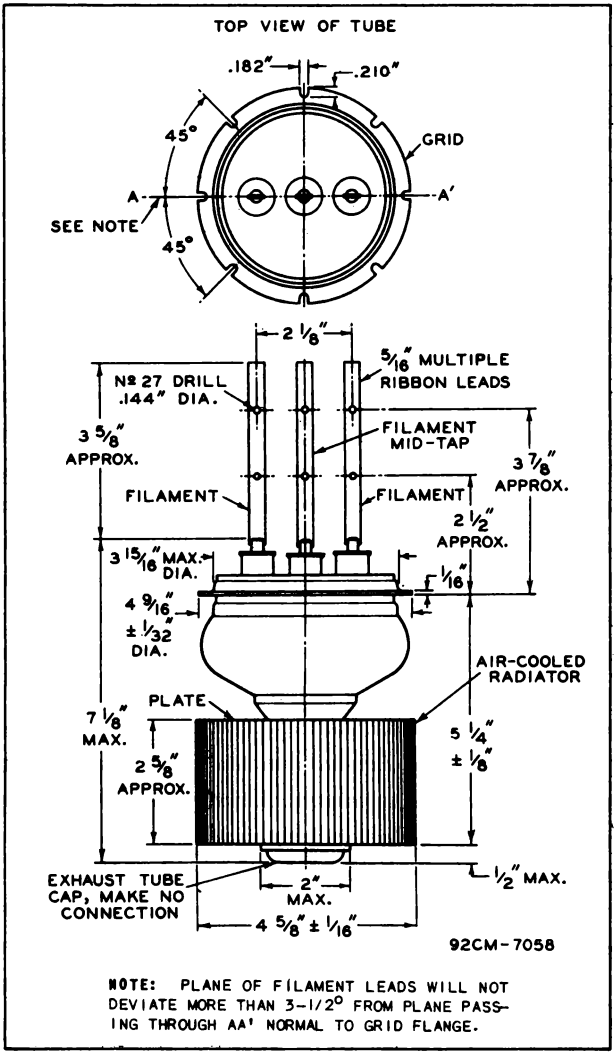
POWER TRIODE



NOTE: PLANE OF FILAMENT LEADS WILL NOT DEVIATE MORE THAN 3-1/2° FROM PLANE PASSING THROUGH AA' NORMAL TO GRID FLANGE.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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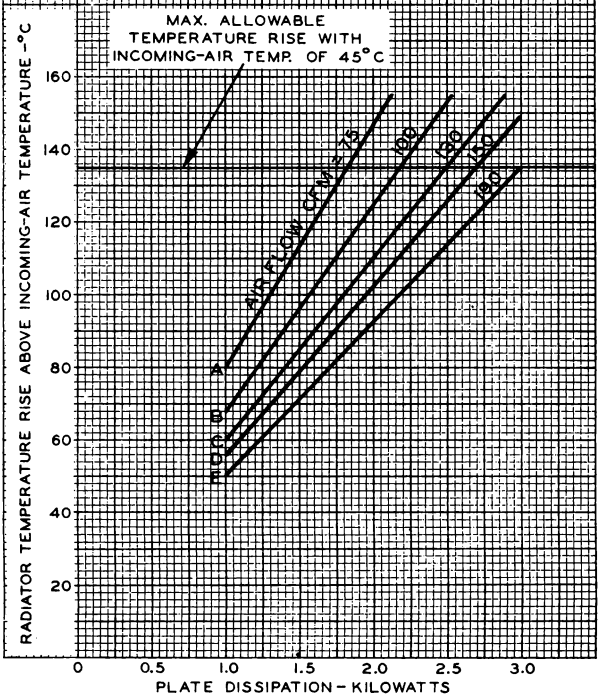
COOLING REQUIREMENTS

E_f = 12.6 VOLTS AC MAXIMUM RADIATOR TEMPERATURE = 180°C

CURVE	PRESSURE DROP INCHES OF WATER
A	0.26
B	0.40
C	0.61
D	0.80
E	1.21

CURVES TAKEN ACCORDING TO NAFM* STANDARDS – BULLETIN Nº 103

*NATIONAL ASSOCIATION OF FAN MFRS., GENERAL MOTORS BLDG., DETROIT, MICH.



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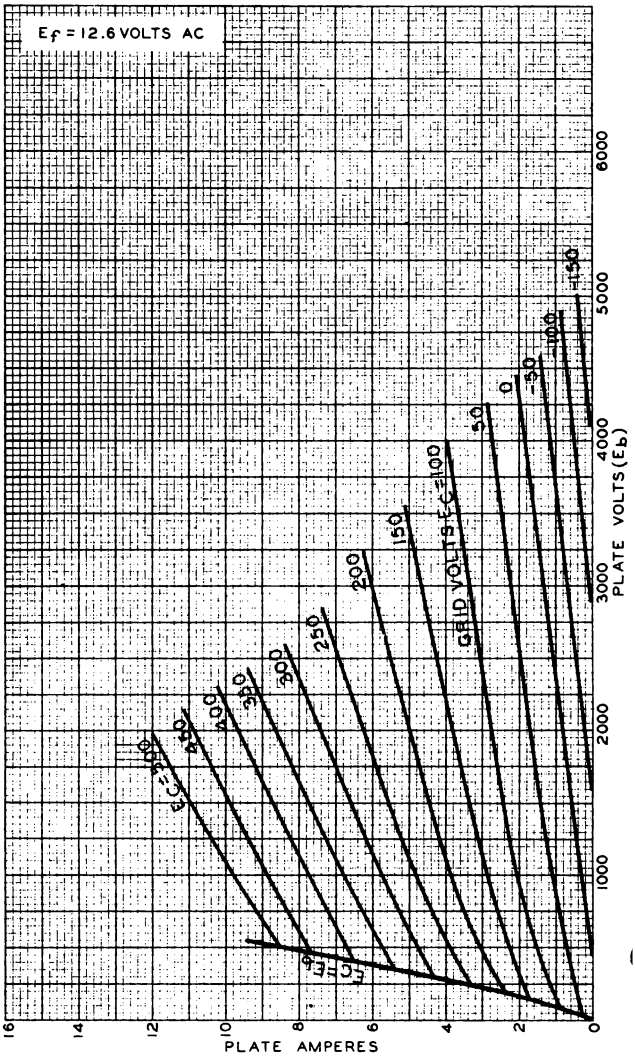
AVERAGE PLATE CHARACTERISTICS



SEPT. 24, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7079.

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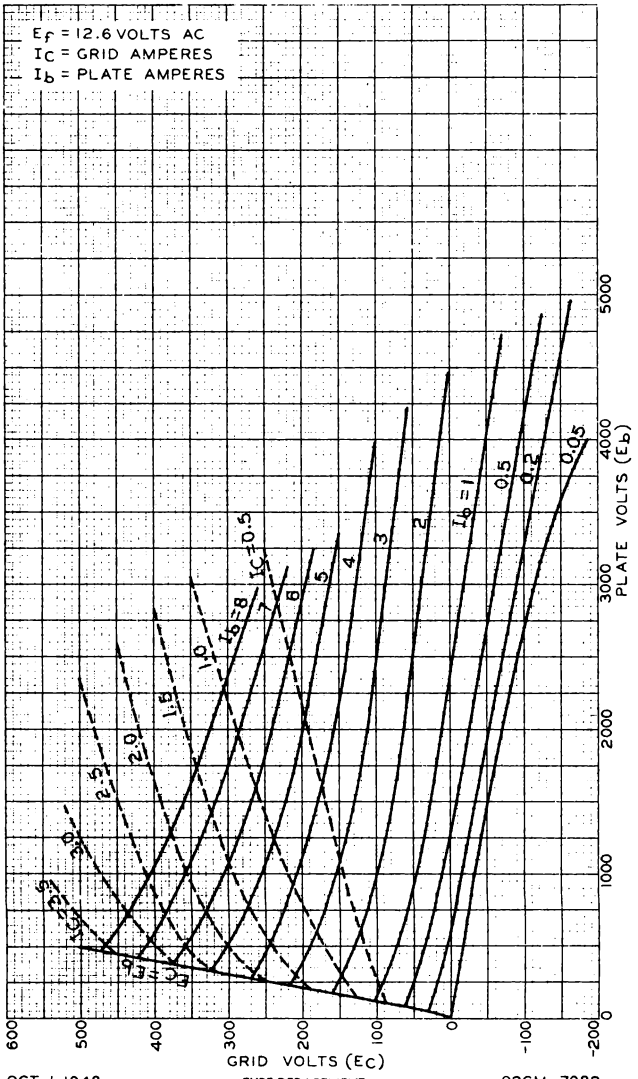
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

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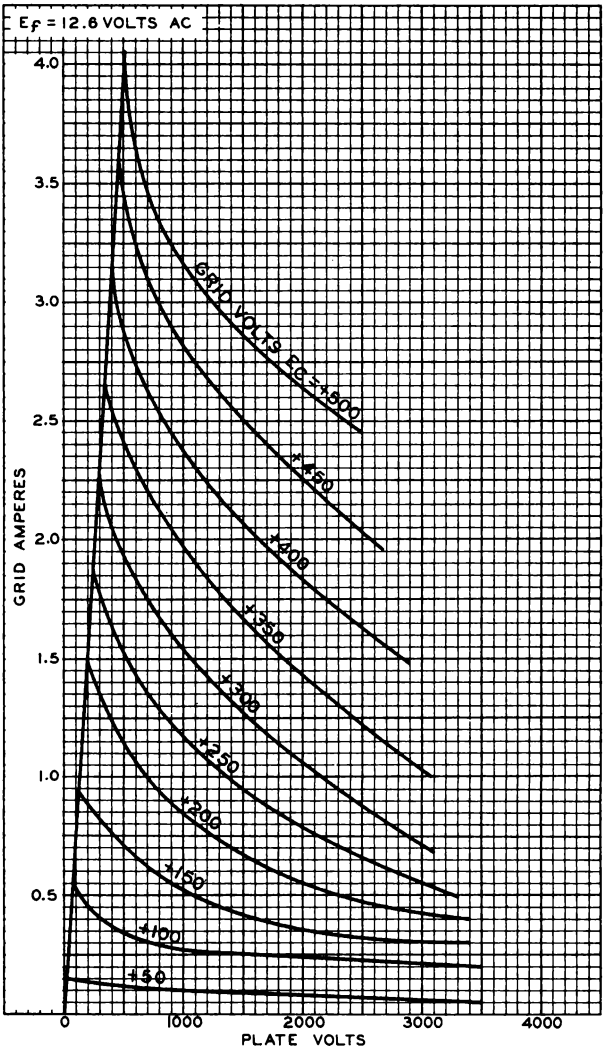
TYPICAL GRID CHARACTERISTICS



SEPT. 29, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7081

5763
VHF BEAM POWER TUBE

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.0 ± 10%	ac or dc volts
Current	0.75	amp
Transconductance for plate current of 45 ma.	7000	μmhos
Mu-Factor, Grid No.2 to Grid No.1	16	
Direct Interelectrode Capacitances:°		
Grid No.1 to Plate	0.3 max.	μμf
Input	9.5	μμf
Output	4.5	μμf

° With no external shield.

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (excluding tip)	2" ± 3/32"
Maximum Diameter	7/8"
Bulb	T-6-1/2
Base	Small-Button Noval 9-Pin (JETEC No.E9-1)
Basing Designation for BOTTOM VIEW	9K

Pin 1 - Plate
Pin 2 - No Connection
Pin 3 - Grid No.3
Pin 4 - Heater

Pin 5 - Heater
Pin 6 - Grid No.2
Pin 7 - Cathode
Pin 8 - Grid No.1
Pin 9 - Grid No.1

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

	CCS●	ICAS●●	
DC PLATE VOLTAGE	250 max.	300 max.	volts
DC GRID-No.3 (SUPPRESSOR) VOLTAGE	0 max.	0 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-125 max.	-125 max.	volts
DC PLATE CURRENT	40 max.	50 max.	ma
DC GRID-No.2 CURRENT	15 max.	15 max.	ma
DC GRID-No.1 CURRENT	5 max.	5 max.	ma
PLATE INPUT	10 max.	15 max.	watts
GRID-No.2 INPUT	1.5 max.	1.5 max.	watts
PLATE DISSIPATION	8 max.	12 max.	watts

●,●●: See next page.

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VHF BEAM POWER TUBE

	CCS●	ICAS●●	
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode . . .	100 max.	100 max.	volts
Heater positive with respect to cathode . . .	100 max.	100 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface) .	250 max.	250 max.	°C

Typical Operation up to 30 Mc:

DC Plate Voltage	250	300	
Grid No.3	Connected to cathode at socket		
DC Grid-No.2 Voltage♦ . . .	250	250	volts
DC Grid-No.1 Voltage★ . . .	-39	-42.5	volts
From a grid resistor of	39000	18000	ohms
Peak RF Grid-No.1 Voltage .	46.5	53.5	volts
DC Plate Current	40	50	ma
DC Grid-No.2 Current	5.6	6	ma
DC Grid-No.1 Current (Approx.) . . .	1	2.4	ma
Driving Power (Approx.) . .	0.05	0.15	watt
→ Useful Power Output (Approx.)	6.4■	10■	watts

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance	0.1 max.	megohm

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy□
and
RF POWER AMPLIFIER--Class C FM Telephony

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	300 max.	350 max.	volts
DC GRID-No.3 (SUPPRESSOR) VOLTAGE	0 max.	0 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-125 max.	-125 max.	volts
DC PLATE CURRENT	50 max.	50 max.	ma
DC GRID-No.2 CURRENT	15 max.	15 max.	ma
DC GRID-No.1 CURRENT	5 max.	5 max.	ma
PLATE INPUT	15 max.	17 max.	watts

♦ Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate supply through a series resistor.

★ Obtained from grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

□ Key down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●, ●●, ■: See next page. → Indicates a change

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5763

VHF BEAM POWER TUBE

	CCS●	ICAS●●	
GRID-No.2 INPUT	2 max.	2 max.	watts
PLATE DISSIPATION	12 max.	13.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode . . .	100 max.	100 max.	volts
Heater positive with respect to cathode . . .	100 max.	100 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface). .	250 max.	250 max.	°C
Typical Operation up to 30 Mc:			
DC Plate Voltage	300	350	volts
Grid No.3	Connected to cathode at socket		
DC Grid-No.2 Voltage	250	250	volts
DC Grid-No.1 Voltage⊕	-28.5	-28.5	volts
From a grid resistor of . .	18000	18000	ohms
Peak RF Grid-No.1 Voltage . .	37.5	37	volts
DC Plate Current	50	48.5	ma
DC Grid-No.2 Current	6.6	6.2	ma
DC Grid-No.1 Current (Approx.)	1.6	1.6	ma
Driving Power (Approx.) . . .	0.1	0.1	watt
Useful Power Output (Approx.)	10.3■	12■	watts ←
Typical Operation at 50 Mc:			
DC Plate Voltage	300	-	volts
Grid No.3	Connected to cathode at socket		
DC Grid-No.2 Voltage	250	-	volts
DC Grid-No.1 Voltage⊕	-60	-	volts
From a grid resistor of . .	22000	-	ohms
Peak RF Grid-No.1 Voltage . .	80	-	volts
DC Plate Current	50	-	ma
DC Grid-No.2 Current	5	-	ma
DC Grid-No.1 Current (Approx.)	3	-	ma
Driving Power (Approx.) . . .	0.35	-	watt
Useful Power Output (Approx.)	7■	-	watts ←

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance	0.1 max.	megohm

FREQUENCY MULTIPLIER

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	300 max.	volts
DC GRID-No.3 (SUPPRESSOR) VOLTAGE	0 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .	-125 max.	volts
DC PLATE CURRENT	50 max.	ma

● Continuous Commercial Service.
●● Intermittent Commercial and Amateur Service.
⊕,■: See next page. ← Indicates a change

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VHF BEAM POWER TUBE

DC GRID-No.2 CURRENT	15 max.	ma
DC GRID-No.1 CURRENT	5 max.	ma
PLATE INPUT	15 max.	watts
GRID-No.2 INPUT	2 max.	watts
PLATE DISSIPATION	12 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	250 max.	°C

Typical Operation:

	Doubler to 175 Mc	*Tripler to 175 Mc*	
DC Plate Voltage	300	300	volts
Grid No.3	Connected to cathode at socket		
DC Grid-No.2 Voltage	*	*	volts
DC Grid-No.1 Voltage●	-75	-100	volts
From grid resistor of	75000	100000	ohms
Peak RF Grid-No.1 Voltage	95	120	volts
DC Plate Current	40	35	ma
DC Grid-No.2 Current	4	5	ma
DC Grid-No.1 Current (Approx.)	1	1	ma
Driving Power (Approx.)	0.6	0.6	watt
Useful Power Output (Approx.)	2.1■	1.3■	watts

Maximum Circuit Values (For maximum rated conditions):

→ Grid-No.1-Circuit Resistance . . . . . 0.1 max. megohm

→ **CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN**

	Note	*Min.*	*Max.*	
Heater Current	1	0.69	0.81	amp
Grid No.1-Plate Capacitance	2	-	0.3	μμf
Input Capacitance	2	8.0	11.0	μμf
Output Capacitance	2	3.8	5.2	μμf
Transconductance	1,3	5100	8900	μmhos
Plate Current	1,3	33	57	ma
Grid-No.2 Current	1,3	-	10	ma
Reverse Grid-No.1 Current	1,4	-	2	μamp

NOTE 1: With 6 volts ac or dc on heater.

NOTE 2: With no external shield.

NOTE 3: With dc plate voltage of 250 volts, dc grid-No.2 voltage of 250 volts, and dc grid-No.1 voltage of -7.5 volts.

NOTE 4: With dc plate voltage of 250 volts, dc grid-No.2 voltage of 250 volts, dc grid-No.1 voltage of -7.5 volts, and grid-No.1-circuit resistance of 0.1 megohm.

● Obtained from a fixed supply, or by a grid-No.1 resistor of value shown.

■ This value of useful power is measured at load of output circuit.

Data on Operating Frequencies for the 5763 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

→ Indicates a change

5763

AVERAGE CHARACTERISTICS

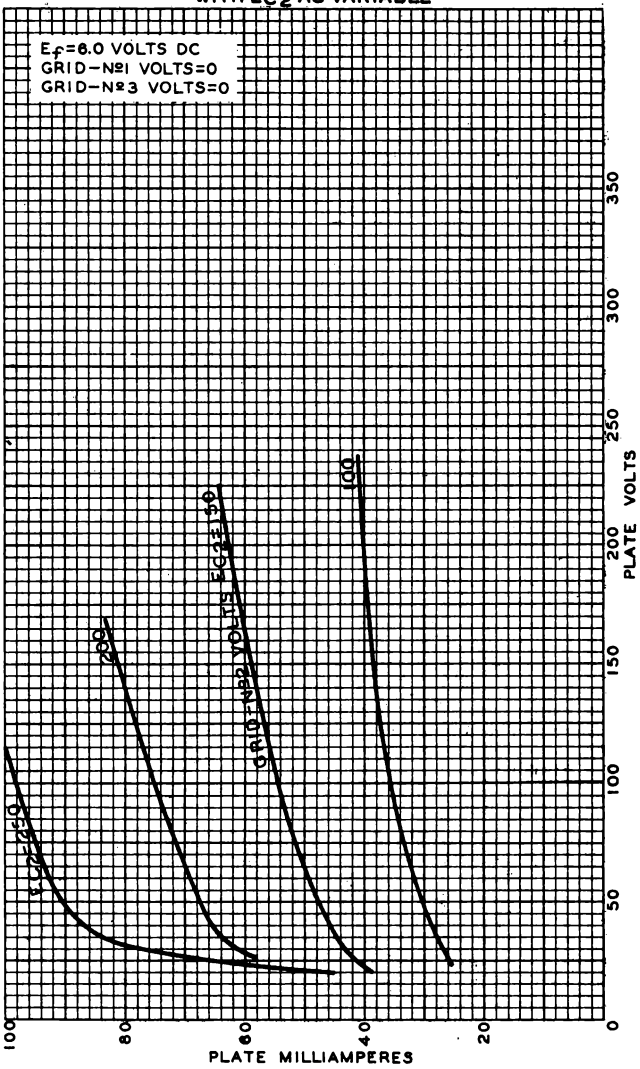
JAN. 12, 1949 — TUBE DEPARTMENT — 92CM-7160

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5763

5763

AVERAGE PLATE CHARACTERISTICS
WITH E_{C2} AS VARIABLE



JAN.10,1949

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7159

5770

5770

POWER TRIODE

WATER & FORCED-AIR COOLED, GROUNDED-GRID TYPE

GENERAL DATA

Electrical:

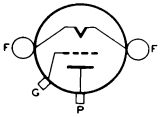
Filament, Multistrand Thoriated-Tungsten:

Excitation . . . Single Phase AC or DC		
Voltage.	11 ± 0.6	ac or dc volts
Current.	285	amp
Starting Current:	It is not necessary to provide means for limiting filament starting current on this type. Full rated filament voltage can be applied safely to the cold filament.	←
Cold Resistance.	0.005	ohm
Minimum Heating Time . .	15	seconds
Amplification Factor . . .	39	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate.	53	μμf
Grid to Filament	89	μμf
Plate to Filament. . . .	1.2	μμf

Mechanical:

Terminal Connections:

F - Filament
G - Grid-Flange Terminal



P - Water-Cooled Plate Terminal

Mounting Position.	Vertical, Filament End Up
Maximum Overall Length	24-1/2"
Maximum Diameter	9-1/2"
Water Flow	20 to 25 gpm

The specified water flow must start before the application of any voltages, and may be removed simultaneously with the filament and plate power.

Air Flow:

To Plate Seal and Bulb:

At frequencies below 1.7 Mc.	Natural	
At frequencies above 1.7 Mc.	Up to 250	cfm

Adequate forced-air cooling should be provided to limit the temperature of the plate seal and bulb to their specified maximum values. The amount of air flow required will increase with the operating frequency. The cooling air should start before the application of any voltages and should be distributed uniformly around the plate seal by means of a suitable air manifold and an air deflector. The air flow may be removed simultaneously with filament and plate power.

To Filament Seals and Grid Seal.	10 min.	cfm

The specified air flow should be directed vertically from a 1-1/4" diameter nozzle into the filament header before and during the application of any voltages. It may be removed simultaneously with filament and plate power.

Outlet Water Temperature	70 max.	°C
Bulb Temperature	180 max.	°C
Seal Temperature (Filament, grid, plate) . .	165 max.	°C

← Indicates a change.

5770

POWER TRIODE

Components:

Water Jacket	RCA MI-19460
Gasket	RCA MI-27001
Air Manifold	RCA MI-19482-1
Air Deflector	RCA MI-19482-2
Filament Connector (2 required)	RCA MI-19481
Corona Shield	RCA MI-27008
Felt Pad (for corona shield)	RCA MI-27009
Porcelain Insulator	RCA MI-27002
Mounting Clamp	RCA MI-27003
Filament Transformer	RCA-212T1
Current Limiting Reactor	RCA-204R1

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	15000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	6 max.	amp
MAX.-SIGNAL PLATE INPUT*	90 max.	kw
PLATE DISSIPATION*	50 max.	kw

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	10200	15000	volts
DC Grid Voltage	-220	-320	volts
Peak AF Grid-to-Grid Voltage	900	1560	volts
Zero-Signal DC Plate Current	0.6	0.6	amp
Max.-Signal DC Plate Current	5.8	12	amp
Effective Load Resistance (Plate-to-plate)	3600	2640	ohms
Max.-Sig. Driving Power (Approx.)#	120	688	watts
Max.-Sig. Power Output (Approx.)	37	117	kw

* Averaged over any audio-frequency cycle of sine-wave form.

\# The driving stage should have good regulation and should be capable of supplying considerably more than the specified driving power.

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	12500 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	5.0 max.	amp
DC GRID CURRENT	1.25 max.	amp
PLATE INPUT	60 max.	kw
PLATE DISSIPATION	33 max.	kw

Typical Operation:

DC Plate Voltage	10200	12500	volts
DC Grid Voltage⊕	-1500	-1500	volts
	2100	1400	ohms

●, ⊕: See next page.

5770

POWER TRIODE

Peak RF Grid Voltage	2070	2180	volts
DC Plate Current	3.3	4.5	amp
DC Grid Current (Approx.)□	0.72	1.1	amp
Driving Power (Approx.)□	1350	2160	watts
Power Output (Approx.)	28	45	kw

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	17000 max.	volts
DC GRID VOLTAGE	–2000 max.	volts
DC PLATE CURRENT	9 max.	amp
DC GRID CURRENT	1.25 max.	amp
PLATE INPUT	150 max.	kw
PLATE DISSIPATION	50 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	14000	17000	volts
DC Grid Voltage▲▲	–900	–1450	volts
	125	150	ohms
	750	1320	ohms
Peak RF Grid Voltage	1600	2375	volts
DC Plate Current	6	8.5	amp
DC Grid Current (Approx.)□	1.2	1.1	amp
Driving Power (Approx.)□	1700	2300	watts
Power Output (Approx.)	65	105	kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.)□	6250	11200	watts
Power Output	70	114	kw

□ For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—*Grid Current and Driving Power* in the General Section.

⊕ Obtained by grid resistor (2100, 1400) or by partial self-bias methods.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

▲▲ Obtained from cathode resistor (125, 150) or grid resistor (750, 1320) or by partial self-bias methods.

● Continuous Commercial Service.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	265	305	amp
Amplification Factor	1,2	34	44	
Grid-Plate Capacitance	–	47	59	μμf
Grid-Filament Capacitance	–	74	104	μμf
Plate-Filament Capacitance	–	0.8	1.6	μμf
Grid Voltage	1,3	–310	–490	volts
Plate Voltage	1,4	7000	9000	volts

5770
POWER TRIODE

	Note	Min.	Max.	
Plate Voltage.	1,5	3600	4600	volts
Peak Cathode Current	1,6	50	-	amp
Useful Power Output.	1,7	85	-	kw

Note 1: With 11.0 volts ac on filament.

Note 2: With dc grid voltage of -50 volts, and with plate voltage adjusted to give dc plate current of 2 amperes.

Note 3: With dc plate voltage of 15000 volts, and with grid voltage adjusted to give dc plate current of 0.05 ampere.

Note 4: With dc grid voltage of -100 volts, and with plate voltage adjusted to give dc plate current of 2 amperes.

Note 5: With dc grid voltage of 0 volts, and with plate voltage adjusted to give dc plate current of 2 amperes.

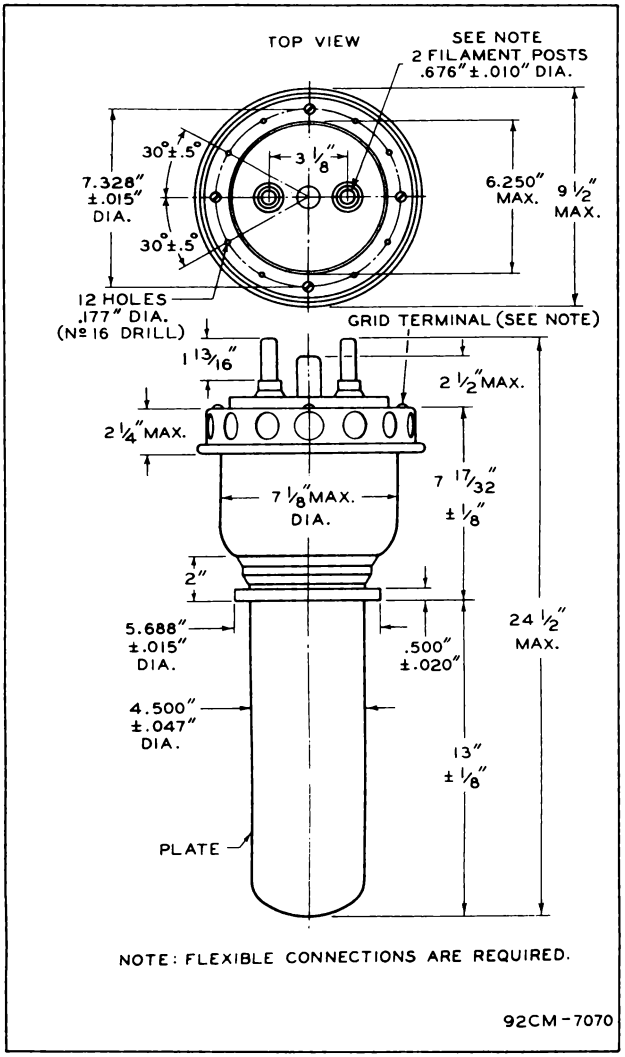
Note 6: Represents the maximum usable cathode current (plate current and grid current) for the tube under any condition of operation.

Note 7: With dc plate voltage of 17000 volts, dc plate current of 8.5 amperes, dc grid current of 1.0 to 1.25 amperes, grid resistor of 1600 ± 10% ohms, and frequency of 1.5 Mc.

Data on operating frequencies for the 5770 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

CURVES
for the 5770 are the same
as those for Type 5671

5770
POWER TRIODE



5771

5771

POWER TRIODE

WATER & FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament, Multistrand Thoriated-Tungsten:

Excitation . . . . Single Phase AC or DC		
Voltage.	7.5 ± 0.4	ac or dc volts
Current.	170	amp
Starting Current: The filament current should never exceed 800 amperes, even momentarily.		
Cold Resistance. . . .	0.0055	ohm
Minimum Heating Time .	15	seconds
Amplification Factor . .	20	
Direct Interlectrode Capacitances (Approx.):		
Grid to Plate.	24.5	μμf
Grid to Filament . . .	47	μμf
Plate to Filament. . .	3	μμf

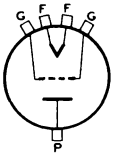
Mechanical:

Terminal Connections:

F - Filament

G - Grid

P - Water-Cooled Plate



Grid terminals are spaced diametrically wider than filament terminals.

Mounting Position.	Vertical, Filament End Up	
Maximum Overall Length	11-5/16"	
Maximum Diameter	7"	
Water Flow	12 to 20	gpm

The specified water flow must start before application of any voltages, and may be removed simultaneously with the filament and plate power.

Air Flow	20 min.	cfm

The specified air flow should be directed vertically from a 3"-diameter nozzle onto the top portion of the bulb before and during the application of any voltages.

Outlet Water Temperature	70 max.	°C
Bulb Temperature	180 max.	°C
Seal Temperature (Filament, grid, plate) . .	165 max.	°C

Components:

Water Jacket	RCA MI-19461
Jacket Wrench.	RCA MI-19436
Gasket	RCA MI-7441
Terminal-Post Chuck Connector (4 required) . .	RCA MI-19466
Chuck Wrench (2 required).	RCA MI-19424
Filament Transformer	RCA-203T1

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	12500 max.	volts

●: See next page.

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POWER TRIODE

MAX.-SIGNAL DC PLATE CURRENT*	5 max.	amp
MAX.-SIGNAL PLATE INPUT*	45 max.	kw
PLATE DISSIPATION*	22.5 max.	kw

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	12500	volts
DC Grid Voltage	-600	volts
Peak AF Grid-to-Grid Voltage	1900	volts
Zero-Signal DC Plate Current	1	amp
Max.-Signal DC Plate Current	6.4	amp
Effective Load Resistance (Plate-to-plate)	4400	ohms
Max.-Signal Driving Power (Approx.)#	430	watts
Max.-Signal Power Output (Approx.)	55	kw

* Averaged over any audio-frequency cycle of sine-wave form.

\# The driving stage should have good regulation and should be capable of supplying considerably more than the specified driving power.

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	12500 max.	volts
DC PLATE CURRENT	4 max.	amp
PLATE INPUT	33 max.	kw
PLATE DISSIPATION	22.5 max.	kw

Typical Operation:

DC Plate Voltage	12500	volts
DC Grid Voltage	-625	volts
Peak RF Grid Voltage	625	volts
DC Plate Current	2.4	amp
DC Grid Current□	0	amp
Driving Power (Approx.)■□	1070	watts
Power Output (Approx.)	12	kw

■ At crest of audio-frequency cycle with modulation factor of 1.0.

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	10000 max.	volts
DC GRID VOLTAGE	-1600 max.	volts
DC PLATE CURRENT	4 max.	amp
DC GRID CURRENT	0.8 max.	amp
PLATE INPUT	40 max.	kw
PLATE DISSIPATION	15 max.	kw

●,□: See next page.

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POWER TRIODE

Typical Operation:

DC Plate Voltage	10000	volts
DC Grid Voltage⊕	-840	volts
	1075	ohms
Peak RF Grid Voltage	1440	volts
DC Plate Current	3.8	amp
DC Grid Current (Approx.)□	0.78	amp
Driving Power (Approx.)□	1010	watts
Power Output (Approx.)	29	kw

⊕ Obtained by grid resistor of value shown or by partial self-bias methods.

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum CCS● Ratings, *Absolute Values:*

	1.6 to 25 Mc	*Below 1.6 Mc*	
DC PLATE VOLTAGE	12500 max.	15000 max.	volts
DC GRID VOLTAGE	-1600 max.	-1600 max.	volts
DC PLATE CURRENT	6 max.	6 max.	amp
DC GRID CURRENT	0.8 max.	0.8 max.	amp
PLATE INPUT	60 max.	67.5 max.	kw ←
PLATE DISSIPATION	22.5 max.	22.5 max.	kw

Typical Operation:

DC Plate Voltage	10000	10000	12500	15000	volts
DC Grid Voltage▲▲	-720	-770	-630	-990	volts
	140	115	115	185	ohms
	1040	1000	840	1240	ohms
Peak RF Grid Voltage	1290	1440	1230	1620	volts
DC Plate Current	4.5	6	4.8	4.5	amp
DC Grid Current (Approx.)□	0.69	0.77	0.75	0.8	amp
Driving Power (Approx.)□	800	1000	1050	1160	watts
Power Output (Approx.)	33	40	44	53	kw

● Continuous Commercial Service.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

□ For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—*Grid Current and Driving Power* in the General Section.

▲▲ Obtained from cathode resistor (140, 115, 115, 185), or grid resistor (1040, 1000, 840, 1240) or by partial self-bias methods.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	160	180	amp
Amplification Factor	1,2	17	23	

← Indicates a change.

5771

POWER TRIODE

	Note	Min.	Max.	
Grid-Plate Capacitance	-	20	28	μμf
Grid-Filament Capacitance. . .	-	39	55	μμf
Plate-Filament Capacitance . .	-	2.3	3.7	μμf
Plate Voltage.	1,3	5300	7900	volts
Plate Voltage.	1,4	2100	3100	volts
Peak Cathode Current	1,5	35	-	amp
Useful Power Output.	1,6	33	-	kw

Note 1: With 7.5 volts ac on filament.

Note 2: With dc grid voltage of - 100 volts, and with plate voltage adjusted to give dc plate current of 2 amperes.

Note 3: With dc grid voltage of - 200 volts, and with plate voltage adjusted to give dc plate current of 2 amperes.

Note 4: With dc grid voltage of 0 volts, and with plate voltage adjusted to give dc plate current of 2 amperes.

Note 5: Represents the maximum usable cathode current (plate current and grid current) for the tube under any concition of operation.

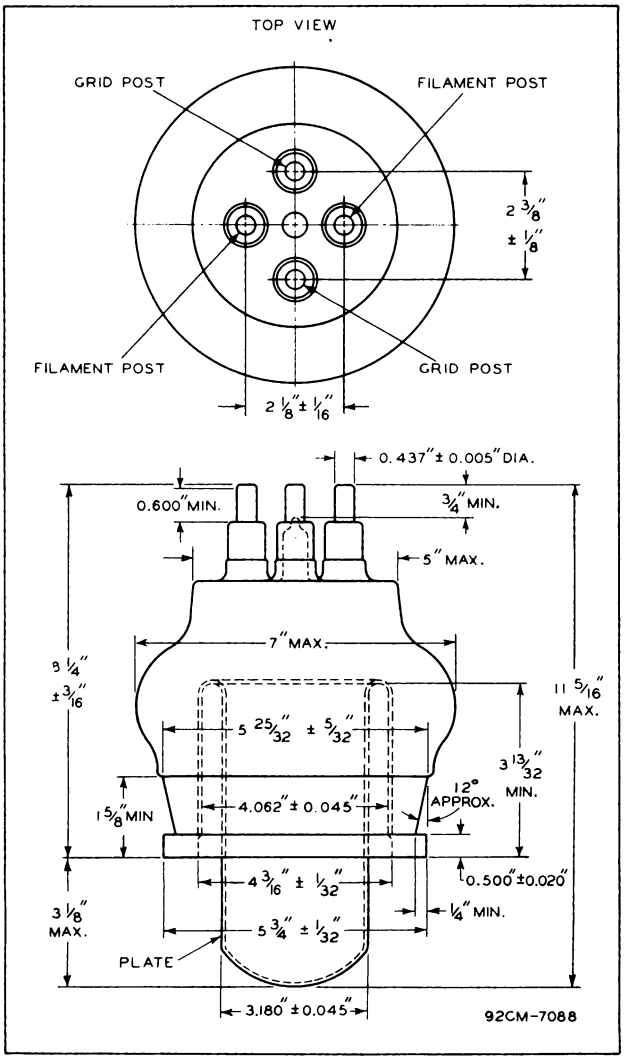
Note 6: With dc plate voltage of 12500 volts, dc plate current of 4.8 amperes, dc grid current of 0.6 to 0.9 ampere, grid resistor of 1600 ± 10% ohms, and frequency of 22 Mc.

Data on operating frequencies for the 5771 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5771

POWER TRIODE



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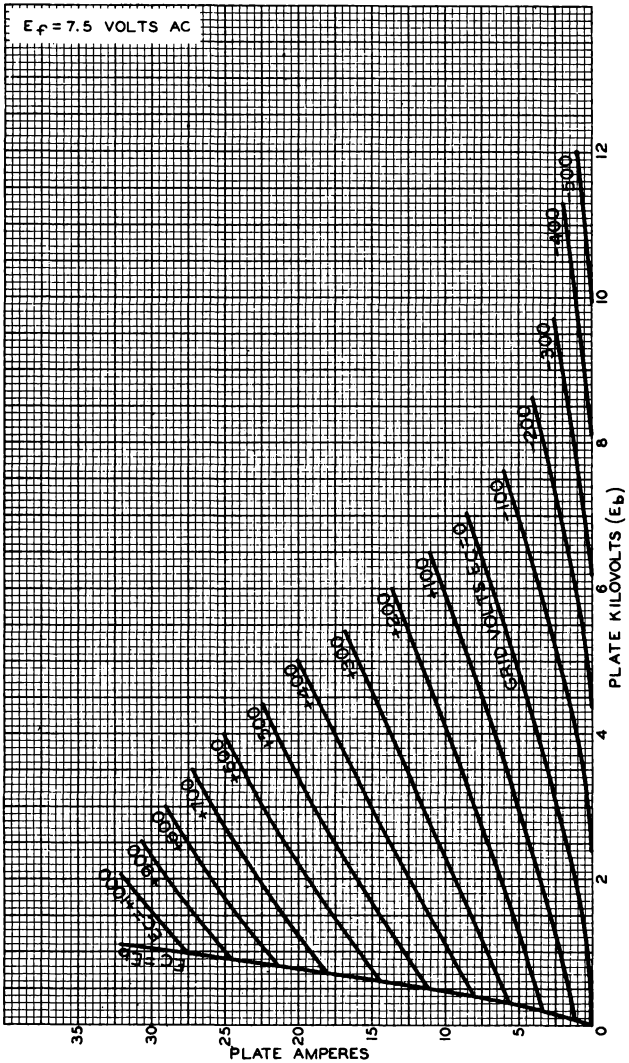
5771

AVERAGE PLATE CHARACTERISTICS



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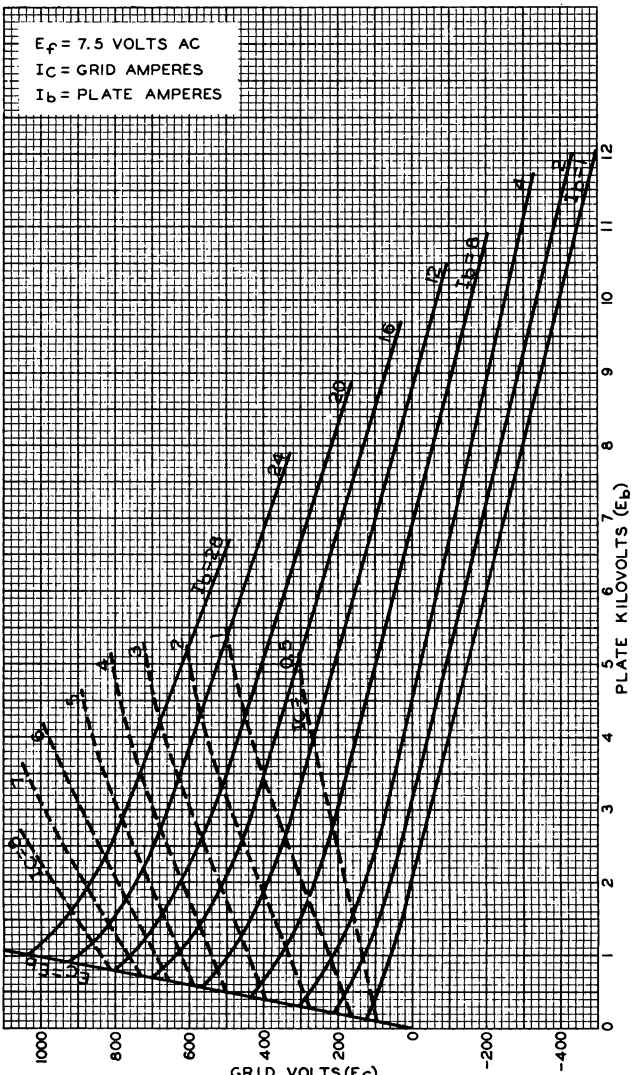
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



OCTOBER 18, 1948

TUBE DEPARTMENT

92CM-7098

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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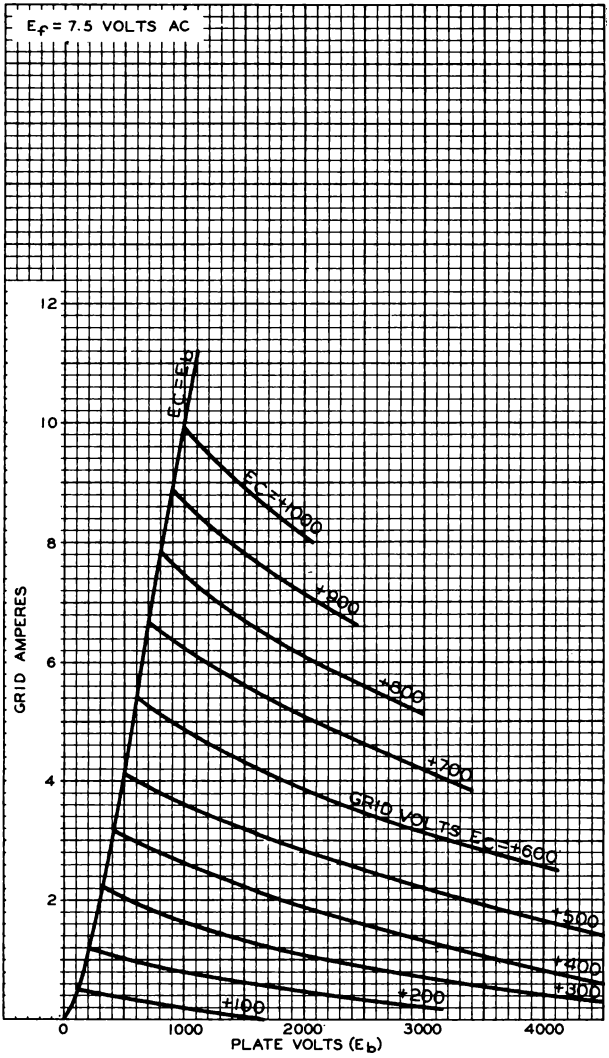
TYPICAL CHARACTERISTICS



5786
POWER TRIODE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament, Thoriated-Tungsten:

Voltage	11 ± 0.6	ac or dc volts
Current	12.5	amp
Starting current:	The filament current must never exceed a value of 50 amperes, even momentarily.	
Cold resistance	0.13	ohm
Amplification Factor for grid-No.1 volts = -25 and plate ma. = 200	32	←

Direct Interelectrode Capacitances: ←

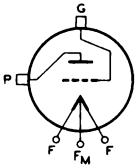
Grid to plate	5.3	μμf
Grid to filament	4.7	μμf
Plate to filament	3.8	μμf

Mechanical:

Terminal Connections:

F - Filament

F_M - Filament Mid-Tap



G - Grid Terminal (Opposite Filament Leads)

P - Radiator-Cooled Plate

Mounting Position	Vertical, grid end up or down
Overall Length	9-3/8" ± 1/4"
Maximum Diameter	2.895"
Radiator	Integral part of tube

Air Flow:

To radiator and seals for maximum rated conditions . 140 min. cfm

Sufficient air must be delivered by a blower to the radiator and seals so that the maximum radiator and seal temperatures will not be exceeded. Air flow must start before the application of any voltages. Filament power, plate power, and air may be removed simultaneously.

Incoming Air Temperature	45 max.	°C
Radiator Temperature (Measured at core at sufficient number of places to insure that rating is not exceeded)	180 max.	°C
Seal Temperature:		
Grid and plate	165 max.	°C
Filament	220 max.	°C
Weight (Approx.)	1.6	lbs

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum CCS● Ratings, *Absolute Values:* ←

DC PLATE VOLTAGE	4000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	500 max.	ma
MAX.-SIGNAL PLATE INPUT*	1500 max.	watts
PLATE DISSIPATION*	600 max.	watts

●,*: See next page. ←Indicates a change

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POWER TRIODE

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	3000	volts
DC Grid Voltage#	-95	volts
Peak AF Grid-to-Grid Voltage	470	volts
Zero-Signal DC Plate Current	75	ma
Max.-Signal DC Plate Current	800	ma
Effective Load Resistance (Plate-to-plate)	8600	ohms
Max.-Signal Driving Power (Approx.)	30	watts
Max.-Signal Power Output (Approx.)	1640	watts

* Averaged over any audio-frequency cycle of sine-wave form.

\# Grid voltage is given with respect to mid-point of filament operated on ac or dc.

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	2500 max.	volts
DC GRID VOLTAGE	-500 max.	volts
DC PLATE CURRENT	400 max.	ma
DC GRID CURRENT	150 max.	ma
PLATE INPUT	1000 max.	watts
PLATE DISSIPATION	400 max.	watts

Typical Operation:

DC Plate Voltage	2500	volts
DC Grid Voltage⊕	-350	volts
	2600	ohms
Peak RF Grid Voltage	620	volts
DC Plate Current	400	ma
DC Grid Current (Approx.)□	135	ma
Driving Power (Approx.)□	75	watts
Power Output (Approx.)	810	watts

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without amplitude modulation□□

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	3000 max.	volts
DC GRID VOLTAGE	-500 max.	volts
DC PLATE CURRENT	500 max.	ma
DC GRID CURRENT	150 max.	ma
PLATE INPUT	1500 max.	watts
PLATE DISSIPATION	600 max.	watts

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●, ⊕, □: See next page.

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POWER TRIODE

Typical Operation as RF Power Amplifier:

DC Plate Voltage	3000	volts
DC Grid Voltage▲▲	-200	volts
	2200	ohms
	330	ohms
Peak RF Grid Voltage	450	volts
DC Plate Current	500	ma
DC Grid Current (Approx.)□	90	ma
Driving Power (Approx.)□	36	watts
Power Output (Approx.)	1000	watts

Typical Operation as Oscillator at 160 Mc:

DC Plate Voltage	3000	volts
DC Grid Voltage †	-225	volts
	2000	ohms
	380	ohms
Peak RF Grid Voltage	475	volts
DC Plate Current	500	ma
DC Grid Current (Approx.)□	90	ma
Power Output (Approx.)	1000	watts
Useful Power Output (Approx.)— 85% circuit efficiency	850	watts

▲▲ obtained from fixed supply, by grid resistor (2200) or by cathode resistor (330).

† obtained from fixed supply, by grid resistor (2000) or by cathode resistor (380).

SELF-RECTIFYING OSCILLATOR or AMPLIFIER—Class C

Maximum CCS● Ratings, ***Absolute Values:***

RMS PLATE VOLTAGE	4250 max.	volts
DC GRID VOLTAGE	-300 max.	volts
DC PLATE CURRENT	320 max.	ma
DC GRID CURRENT	85 max.	ma
PLATE INPUT	1500 max.	watts
PLATE DISSIPATION	600 max.	watts

Typical Operation:

RMS Plate Voltage	4250	volts
DC Grid Voltage⊕	-115	volts
	1500	ohms
DC Plate Current	320	ma
DC Grid Current□	77	ma
Driving Power (Approx.)■□	46	watts
Power Output (Approx.)	1050	watts

■ From a self-rectifying driver.

●,□,⊕: See next page.

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POWER TRIODE

AMPLIFIER or OSCILLATOR—Class C

With Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	2700 max.	volts
DC GRID VOLTAGE	−300 max.	volts
DC PLATE CURRENT	450 max.	ma
DC GRID CURRENT	120 max.	ma
PLATE INPUT	1500 max.	watts
PLATE DISSIPATION	600 max.	watts

Typical Operation:

DC Plate Voltage	2700	volts
DC Grid Voltage⊕	−180	volts
	1530	ohms
DC Plate Current	450	ma
DC Grid Current (Approx.)□	118	ma
Driving Power (Approx.)▲□	57	watts
Power Output (Approx.)	1150	watts

● Continuous Commercial Service.

□ For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—*Grid Current and Driving Power* in the General Section.

⊕ Obtained by grid resistor of value shown or by partial self-bias methods.

▲ From a driver with a rectified, unfiltered, single-phase, full-wave plate supply.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	11.7	13.3	amp
Amplification Factor	1,2	27	33	
Grid-Plate Capacitance	–	4.8	5.8	μμf
Grid-Filament Capacitance	–	3.6	4.8	μμf
Plate-Filament Capacitance	–	2.8	4.0	μμf
Plate Voltage	1,3	1030	1350	volts
Plate Voltage	1,4	2400	3000	volts
Grid Voltage	1,5	–	−130	volts
Peak Cathode Current	1,6	6	–	amp
Useful Power Output	1,7	800	–	watts

Note 1: With 11 volts ac on filament

Note 2: With dc grid voltage of −25 volts, and plate voltage adjusted to give dc plate current of 200 ma.

Note 3: With dc grid voltage of 0 volts, and plate voltage adjusted to give dc plate current of 200 ma.

Note 4: With dc grid voltage of −50 volts, and plate voltage adjusted to give dc plate current of 200 ma.

Note 5: With dc plate voltage of 3000 volts, and grid voltage adjusted to give a dc plate current of 1 ma.

Note 6: Represents the maximum usable cathode current (plate current and grid current) for the tube under any condition of operation.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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POWER TRIODE

Note 7: With dc plate voltage of 3000 volts, dc plate current of 500 ma., dc grid current of 80 to 120 ma., grid resistor of 2000 ± 10% ohms, and frequency of 160 Mc.

Data on operating frequencies for the 5786 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

OPERATING NOTES

The quantity of air necessary for adequate cooling of the 5786 will depend on the power input to the tube, as well as on the efficiency and frequency at which the tube is operated. When the 5786 is operated with full power input at the maximum rated frequency of 160 megacycles, and with the circuit adjusted for tube operation at the maximum plate-dissipation rating, sufficient cooling will be provided by a blower such as the Fasco No.50749. This blower is made by F.A. Smith Mfg. Co., Inc., Rochester 2, N.Y. It has an outlet area of approximately 6.25 square inches and is capable of supplying 140 cubic feet of air per minute, free delivery.

Provision must be made to direct part of the air from the blower to the filament and grid seals. For this purpose, a blower duct similar to that shown on the following sheet is suggested. Also sketched is a semi-circular air deflector which is useful in providing adequate cooling to the side of the grid seal away from the incoming air stream.

Depending on the type of application in which the 5786 is used, the required quantity of cooling air and the method employed for directing this air to the radiator and seals will vary considerably. It is recommended, therefore, that operating temperatures be measured in each application to make certain that maximum temperature ratings are not exceeded.

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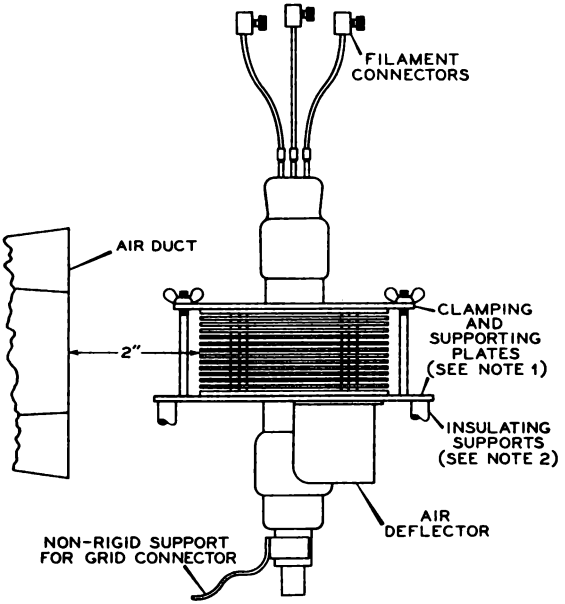
POWER TRIODE

SUGGESTED MOUNTING



92CM-7080R1

NOTE 1: SUPPORTING PLATE AND CLAMPING PLATE HAVE HOLES LARGE ENOUGH TO PERMIT PASSAGE OF THE GLASS BULBS OF THE TUBE.

NOTE 2: TWO OR MORE INSULATORS MAY BE USED. INSULATORS MUST BE PLACED SO AS TO NOT INTEREFERE WITH AIR FLOW ONTO GRID TERMINAL.

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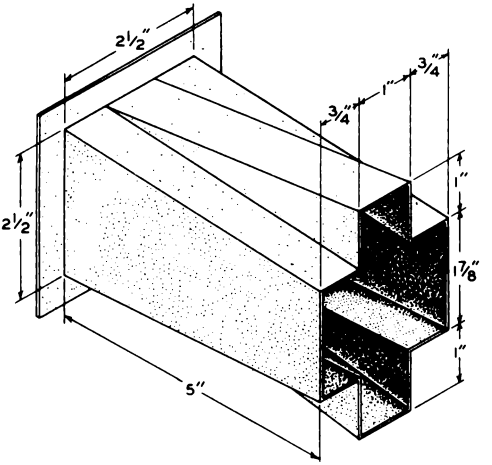
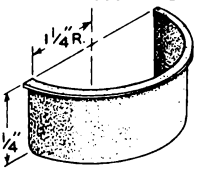
POWER TRIODE

AIR DUCT



AIR DEFLECTOR



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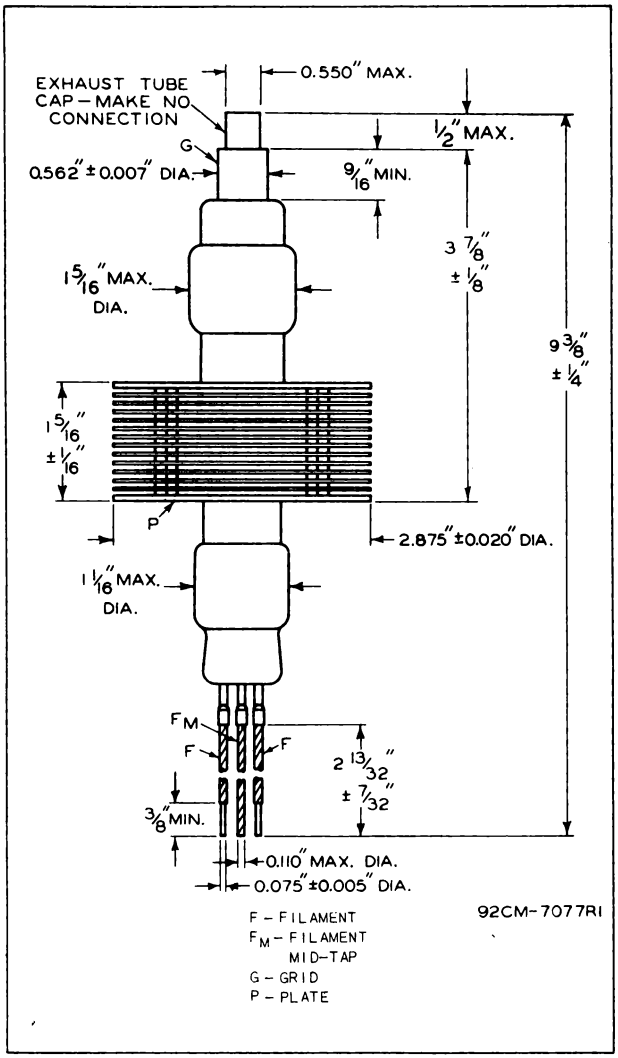
POWER TRIODE



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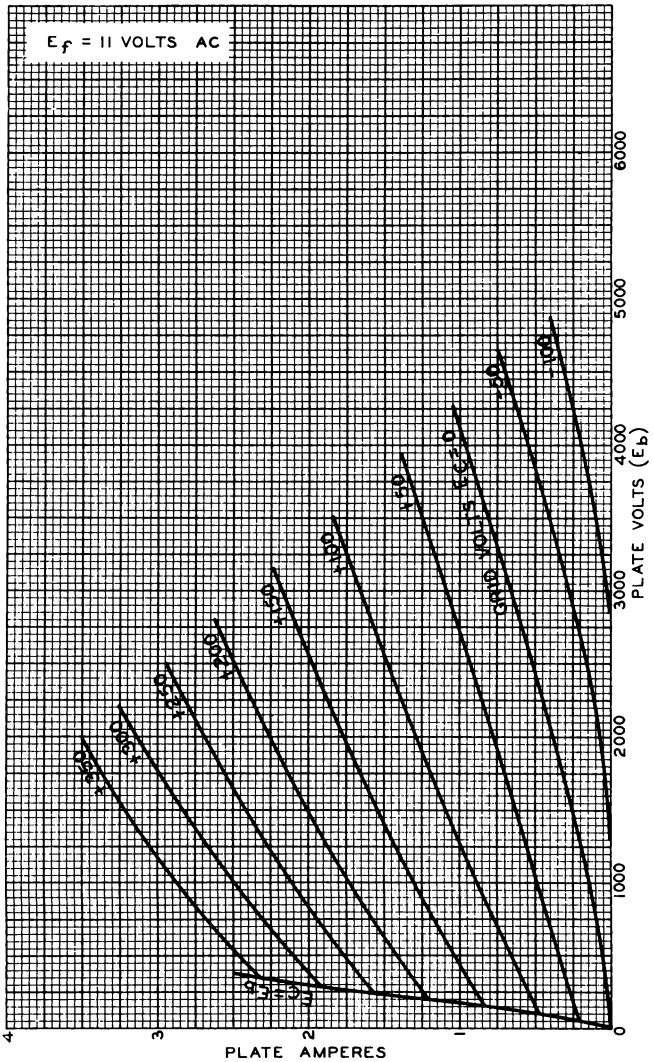
AVERAGE PLATE CHARACTERISTICS



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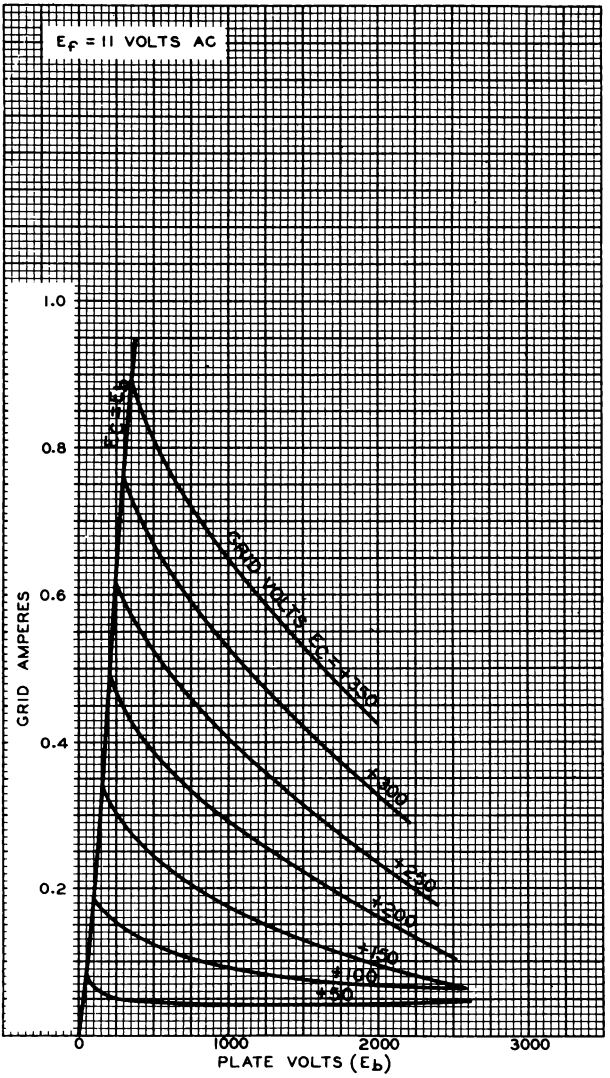
TYPICAL CHARACTERISTICS



5831

SUPER-POWER BEAM TRIODE

WATER COOLED

GENERAL DATA

Electrical:

Filament, Multistrand Thoriated Tungsten:

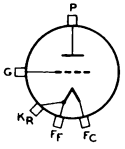
Voltage (Single-Phase)	6	ac volts
Current	2220	amp
Starting Current	Must never exceed 3550 amperes, even momentarily	
Cold Resistance	0.0005	ohm
Minimum Heating Time	60	seconds
Amplification Factor	25	
Direct Interelectrode Capacitances:		
Grid to Plate	150	μμf
Grid to Filament	600	μμf
Plate to Filament	8	μμf

Mechanical:

Terminal Connections:

F_C – Filament Cylindrical Terminal

F_F – Filament Flange Terminal



K_R – Cathode Flange Terminal For Circuit Returns

G – Grid Flange Terminal

P – Plate Flange Terminal

Mounting Position	Vertical, plate end up
Maximum Overall Length	38-3/4"
Maximum Diameter	9-17/32"

Water Cooling:

Water cooling of the beam-forming cylinder, the grid-terminal flange, and the plate is required. The water flow must start before application of any voltages and preferably should continue for several seconds after removal of all voltages. Interlocking of the water flow for each of the cooled elements with all power supplies is recommended to prevent tube damage in case of failure of adequate water flow. The use of distilled or deionized water is essential.

Water Flow:	*Min. Flow* *gpm*	*Pressure Drop* ⊕ *psi*	*Max. Gauge Pressure** *psi*
To Plate:			
For plate dissipation less than 135 kw.	40	10	100
For plate dissipation from 135 to 150 kw.	60	20	100
To Grid Connector	1	–	–
To Beam-Forming Cylinder	6	20	50

Outlet Water Temperature (Any outlet) . . . . 70 max. °C

⊕ Approximate pressure drop directly across cooled element for the indicated minimum flow.

* At tube inlets.

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SUPER-POWER BEAM TRIODE

Seal Temperature (Plate, grid, or filament)	165 max.	°C
Bulb Temperature (At hottest point). . . .	180 max.	°C

Fittings:

Fittings for the plate and beam-forming-cylinder water connections may be obtained from B-R Engineering Company, 309 East Saratoga Street, Baltimore 2, Maryland, U.S.A.

AF POWER AMPLIFIER and MODULATOR—Class B

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	10500 max.	volts
MAX.-SIGNAL DC PLATE CURRENT**	30 max.	amp
MAX.-SIGNAL PLATE INPUT**.	300 max.	kw
PLATE DISSIPATION**.	135 max.	kw

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	10000	volts
DC Grid Voltage.	-390	volts
Peak AF Grid-to-Grid Voltage	1800	volts
Zero-Signal DC Plate Current	6	amp
Max.-Signal DC Plate Current	57	amp
Effective Load Resistance (Plate-to-plate).	425	ohms
Max.-Signal Driving Power (Approx.)▲ . . .	800	watts
Max.-Signal Power Output (Approx.)	370	kw

PLATE-MODULATED RF POWER AMPLIFIER—Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	10500 max.	volts
DC GRID VOLTAGE.	-2000 max.	volts
DC PLATE CURRENT	25 max.	amp
DC GRID CURRENT.	1.5 max.	amp
PLATE INPUT.	250 max.	kw
PLATE DISSIPATION.	135 max.	kw

Typical Operation:

DC Plate Voltage	10000	volts
DC Grid Voltage#	-1350	volts
Peak RF Grid Voltage	2000	volts
DC Plate Current	21.9	amp

** Averaged over any audio-frequency cycle of sine-wave form.

▲ The driving stage should have good regulation and should be capable of supplying considerably more than the indicated value which is the power absorbed by the grid and grid-bias source and does not include circuit losses.

Obtained by grid resistor or by partial self-bias methods.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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SUPER-POWER BEAM TRIODE

DC Grid Current (Approx.)□	0.5	amp
Driving Power (Approx.)□	900	watts
Power Output (Approx.)	175	kw

RF POWER AMPLIFIER and OSCILLATOR—Class C Telegraphy

Key-down conditions per tube without amplitude modulation□□

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	16000 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	41 max.	amp
DC GRID CURRENT	1.5 max.	amp
PLATE INPUT	650 max.	kw
PLATE DISSIPATION	150 max.	kw

Typical Operation:

DC Plate Voltage	11500	16000	volts
DC Grid Voltage♦	-1000	-1200	volts
Peak RF Grid Voltage	1650	2000	volts
DC Plate Current	33	39	amp
DC Grid Current (Approx.)□	0.65	0.5	amp
Driving Power (Approx.)□	1200	900	watts
Power Output (Approx.)	300	500	kw

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

♦ Obtained from fixed supply for amplifier service, or from adjustable grid resistor for oscillator service.

□ For effect of load resistance on grid current and driving power, refer to TUBE RATINGS--*Grid Current and Driving Power* in the General Section.

● Continuous Commercial Service.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	2090	2350	amp
Amplification Factor	1,2	20	30	
Grid-Plate Capacitance	-	125	175	μμf
Grid-Filament Capacitance	-	500	700	μμf
Plate-Filament Capacitance	-	4	12	μμf

Note 1: With 6.0 volts ac on filament.

Note 2: With dc grid voltage of +25 volts, and with plate voltage adjusted to give dc plate current of 10 amperes.

The 5831 may be operated with maximum rated plate voltage and plate input at frequencies up through the "Standard Broadcast Band" and much higher. The limitations for operation at the

5831

SUPER-POWER BEAM TRIODE

higher frequencies have not yet been determined. If operation of the 5831 is contemplated at a higher frequency, write for operating recommendations to Commercial Engineering, RCA, Harrison, N.J., giving complete details as to the proposed service.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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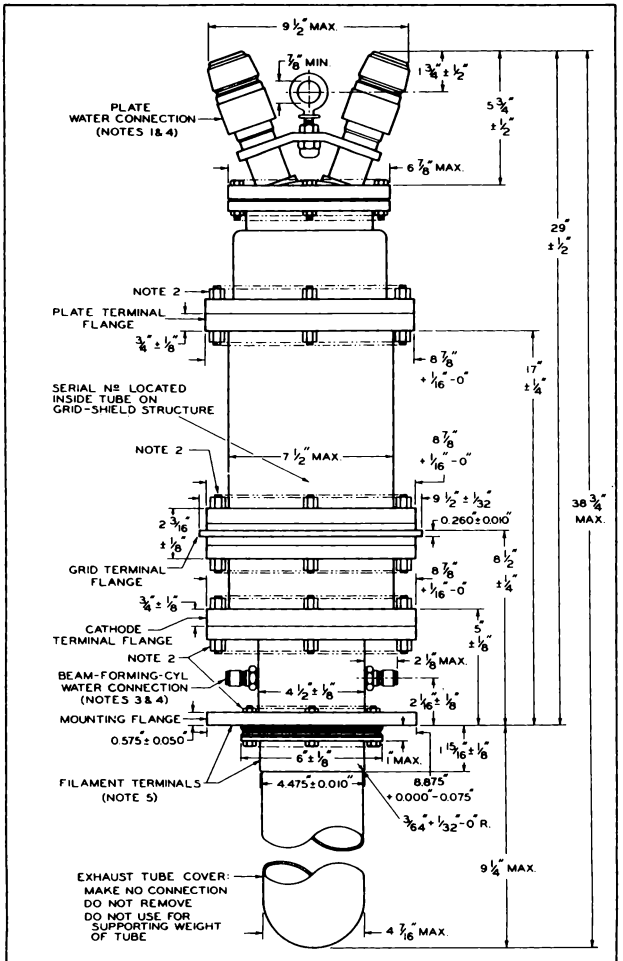
SUPER-POWER BEAM TRIODE



NOTE 1 - PLUG Nº 32-BS, HANSEN MFG. CO., FITTINGS MAY BE OBTAINED FROM B-R ENGINEERING CO., 309 EAST SARATOGA ST., BALTIMORE 2, MD.

92CL-7432

(continued on next page)

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SUPER-POWER BEAM TRIODE

NOTE 2-DO NOT TAMPER WITH BOLTS
NOTE 3-PLUG Nº 4T-25, HANSEN MFG. CO. (SEE NOTE 1)

NOTE 4-DIRECTION OF WATER FLOW THROUGH TUBE SHOULD BE IN DIRECTION INDICATED BY MARKINGS AT WATER CONNECTIONS

NOTE 5-USE FOR FILAMENT POWER ONLY. CIRCUIT RETURNS SHOULD BE MADE TO CATHODE TERMINAL FLANGE

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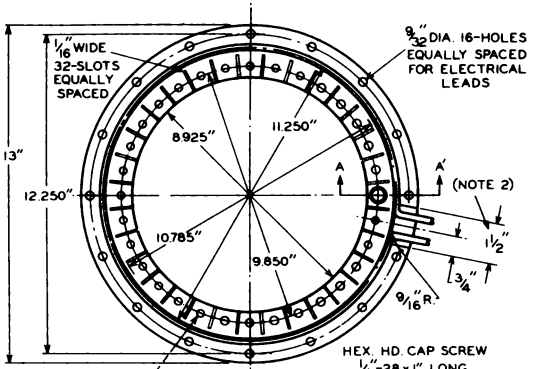
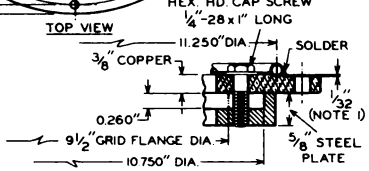
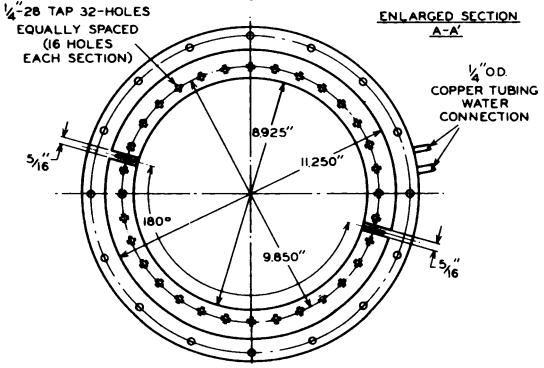
SUPER-POWER BEAM TRIODE

DETAILS OF WATER-COOLED GRID-FLANGE CONNECTOR







BOTTOM VIEW SHOWING REMOVABLE SECTIONS

NOTE 1-CUT CIRCULAR GROOVE, 1/8" RADIUS, 1/32" DEEP FOR TUBING
NOTE 2-END MILL 1/32" DEEP FOR TUBING BEND

92CL-7443

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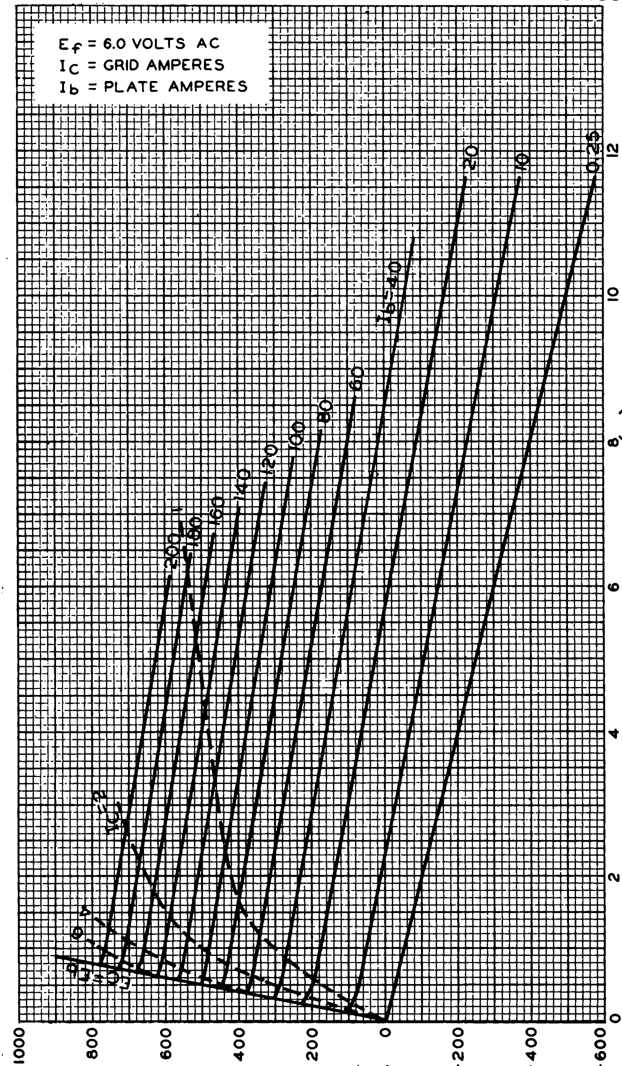
AVERAGE CONSTANT - CURRENT CHARACTERISTICS



JAN. 12, 1950

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7433

5894

TWIN BEAM POWER TUBE

Useful at Frequencies up to 500 Mc

Unless Otherwise Specified, Values are on a Per-Tube Basis

GENERAL DATA

Electrical:

Heater for Unipotential Cathode:

	Series	*Parallel*	
Heater arrangement			
Voltage	12.6 ± 10%	6.3 ± 10%	ac or dc volts
Current	0.9	1.8	. . . . . amp

Mu-Factor, Grid No.2 to (Grid No.1 (Each Unit)
for dc plate volts = 600
dc grid-No.2 volts = 250,
and dc plate ma = 40 . . . . . 8.2

Direct Interelectrode Capacitances (Each Unit):[o]

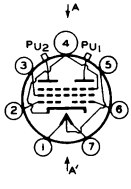
Grid No.1 to plate.	0.8 max.	μμf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, and heater.	11	μμf
Plate to cathode & grid No.3 & internal shield, grid No.2, and heater.	3.4	μμf

Mechanical:

Mounting Position:
Vertical . . . . . Base up or down
Horizontal . . . . . Plate terminals in horizontal plane

Maximum Overall Length . . . . . 4-5/16"
Seated Length. . . . . 3-11/16" ± 3/16"
Maximum Diameter . . . . . 1-15/16"
Bulb T-14
Bulb Terminals (Two) . . . . . *See Dimensional Outline*
Weight (Approx.) . . . . . 2.3 oz
Base . . . . . Small-Wafer Septar 7-Pin (JETEC No.E7-21)

BOTTOM VIEW



Pin 1 - Heater
Pin 2 - Grid No.1 of Unit No.2
Pin 3 - Grid No.2
Pin 4 - Cathode, Grid No.3, Internal Shield
Pin 5 - Heater Mid-Tap
Pin 6 - Grid No.1 of Unit No.1
Pin 7 - Heater
PU_1 - Plate of Unit No.1
PU_2 - Plate of Unit No.2

PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

Plate-Seal Temperature . . . . . 200 max. °C

[o] Without external shield.

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TWIN BEAM POWER TUBE

Base-Seal Temperature	180 max.	°C

Cooling: Free circulation of air around the tube is required. In addition, some forced-air cooling will generally be required to prevent exceeding the specified maximum bulb temperature.

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-175 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	200 max.	ma
MAX.-SIGNAL PLATE INPUT*	120 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT*	7 max.	watts
PLATE DISSIPATION*	40 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

Typical CCS● Operation:

DC Plate Voltage	450	600	volts
DC Grid-No.2 Voltage▲	250	250	volts
DC Grid-No.1 Voltage:			
From fixed-bias source	-23	-25	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	53	53	volts
DC Plate Current:			
Zero-signal value	67	35	ma
Max.-signal value	200	168	ma
DC Grid-No.2 Current:			
Zero-signal value	8	4	ma
Max.-signal value	26	27	ma
DC Grid-No.1 Current:			
Max.-signal value	2.3	1.6	ma
Effective Load Resistance (Plate to plate)	4400	8000	ohms
Max.-Signal Driving Power (Approx.)♦	0.2	0.2	watt
Max.-Signal Power Output (Approx.)♦	60	70	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:▲		
With fixed bias	50000 max.	ohms
With cathode bias	Not recommended	

* Averaged over any audio-frequency cycle of sine-wave form.

▲ Preferably obtained from a separate source or from the plate-voltage supply with a voltage divider.

●, ♦: See next page.

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TWIN BEAM POWER TUBE

PLATE-MODULATED PUSH-PULL RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values*:

For max. plate voltage and max. plate input above 250 Mc, see Rating Chart I

DC PLATE VOLTAGE	450 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-175 max.	volts
DC PLATE CURRENT	160 max.	ma
DC GRID-No.1 CURRENT	10 max.	ma
PLATE INPUT	72 max.	watts
GRID-No.2 INPUT	4.5 max.	watts
PLATE DISSIPATION	27 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

Typical CCS● Operation:

	Up to 250 Mc	*At 470 Mc*	
DC Plate Voltage	450	380	volts
DC Grid-No.2 Voltage (Approx.)♦	250	250	volts
From an adjustable series resistor having a max. value of	20000	30000	ohms
DC Grid-No.1 Voltage★	-100	-60	volts
From a grid-No.1 resistor of	20000	15000	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage	120	-	volts
DC Plate Current	150	160	ma
DC Grid-No.2 Current (Approx.)	16	8	ma
DC Grid-No.1 Current (Approx.)	5	4	ma

♦ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the class B stage. To minimize distortion, the effective resistance per grid-No.1 circuit of the class B stage should be held at a low value. For this purpose, the use of transformer coupling is recommended. In no case, however, should the total dc grid-No.1-circuit resistance exceed 50000 ohms.

♦ Obtained preferable from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor. It is recommended that this resistor be adjustable to permit obtaining the desired operating plate current after initial tuning adjustments are completed.

★ Obtained from a grid-No.1 resistor of value shown or by partial self-bias method. A combination of grid-No.1 resistor and fixed supply has the advantage not only of protecting the tube from damage through loss of excitation but also of minimizing distortion by bias-supply compensation.

●: See next page.

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TWIN BEAM POWER TUBE

	Up to 250 Mc	*At 470 Mc*	
Driver Power			
Output (Approx.)	0.6	13	watts
Useful Power			
Output (Approx.)●●	50	35	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance‡.	50000 max.	ohms

PUSH-PULL RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy□
and
PUSH-PULL RF POWER AMPLIFIER - Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values*:

For max. plate voltage and max. plate input above 250 Mc, see Rating Chart II

DC PLATE VOLTAGE	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE.	-175 max.	volts
DC PLATE CURRENT	220 max.	ma
DC GRID-No.1 CURRENT	10 max.	ma
PLATE INPUT.	120 max.	watts
GRID-No.2 INPUT.	7 max.	watts
PLATE DISSIPATION.	40 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. .	100 max.	volts
Heater positive with respect to cathode. .	100 max.	volts

Typical CCS● Operation:

	Up to 250 Mc	*At 470 Mc*		
DC Plate Voltage	600	400	500	volts
DC Grid-No.2 Voltage (Approx.)● . . .	250	250	250	volts
From an adjustable series resistor having a max. value of.	33000	22000	47000	ohms
DC Grid-No.1 Voltage■. . . .	-80	-38	-60	volts
From a grid-No.1 resistor of.	39000	24000	30000	ohms
From cathode resistor of.	360	180	300	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage.	200	-	-	volts
DC Plate Current	200	220	200	ma

□ Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●, ●●, ‡, ●, ■: See next page.

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TWIN BEAM POWER TUBE

	Up to 250 Mc	At 470 Mc		
DC Grid-No.2 Current (Approx.)	16	12	8	ma
DC Grid-No.1 Current (Approx.)	2	3	4	ma
Driver Power Output (Approx.)	4	5	13	watts
Useful Power Output (Approx.)••	85	43	55	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance‡	50000 max.	ohms

FREQUENCY TRIPLER - Class C

Maximum CCS• Ratings, *Absolute Values*:

For max. plate voltage and max. plate input above, 250 Mc, see Rating Chart III

DC PLATE VOLTAGE	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-175 max.	volts
DC PLATE CURRENT	160 max.	ma
DC GRID-No.1 CURRENT	10 max.	ma
PLATE INPUT	80 max.	watts
GRID-No.2 INPUT	7 max.	watts
PLATE DISSIPATION	40 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

Typical CCS• Operation as Tripler:

	Up to 150 Mc		To 225 Mc	To 462 Mc		
DC Plate Voltage	400	500	400	400	400	volts
DC Grid-No.2 Voltage (Approx.)⊕	250	250	250	220	220	volts
From an adjustable series resistor having max. value of	16000	39000	20000	56000	56000	ohms

• Continuous Commercial Service.

⊕ Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should be used only when the 5894 is used in a circuit which is not keyed. It is recommended that this resistor be adjustable to permit obtaining the desired operating plate current after initial tuning adjustments are completed.

••,‡,■: See next page.

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TWIN BEAM POWER TUBE

	Up to 150 Mc		*To 225 Mc*	*To 462 Mc*		
DC Grid-No.1 Voltage■	-150	-150	-150	-150	-175	volts
From a grid-No.1 resistor of. . .	30000	24000	50000	36000	36000	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage.	360	360	360	-	-	volts
DC Plate Current . .	146	120	130	130	140	ma
DC Grid-No.2 Current (Approx.).	16	10	20	5	5	ma
DC Grid-No.1 Current (Approx.).	5	6	3	4	5	ma
Driver Power Output (Approx.).	0.9	1	0.5	4	8	watts
Useful Power Output (Approx.)●●. . . .	18	20	12	13	16	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance‡.	50000 max.	ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current:				
Series connection	1	0.8	1	amp
Parallel connection	2	1.6	2	amp
Mu-Factor, Grid No.2 to Grid No.1 (Each Unit)	2,3	7	9.3	
Direct Interelectrode Capacitances (Each Unit):				
Grid No.1 to plate.	4	-	0.08	μμf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, and heater.	4	9.4	11.6	μμf
Plate to cathode & grid No.3 & internal shield, grid No.2, and heater	4	2.6	3.7	μμf

Note 1: With 12.6 volts ac on heater.

Note 2: With 6.3 volts ac on heater.

Note 3: With dc plate voltage of 600 volts, dc grid-No.2 voltage of 250 volts, and dc plate current of 40 ma.

Note 4: Without external shield.

●● This value of useful power output is measured at load of output circuit.

‡ When grid No.1 is driven positive, the total dc grid-No.1-circuit resistance should not exceed the specified value of 50000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply.

■ Obtained from a fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

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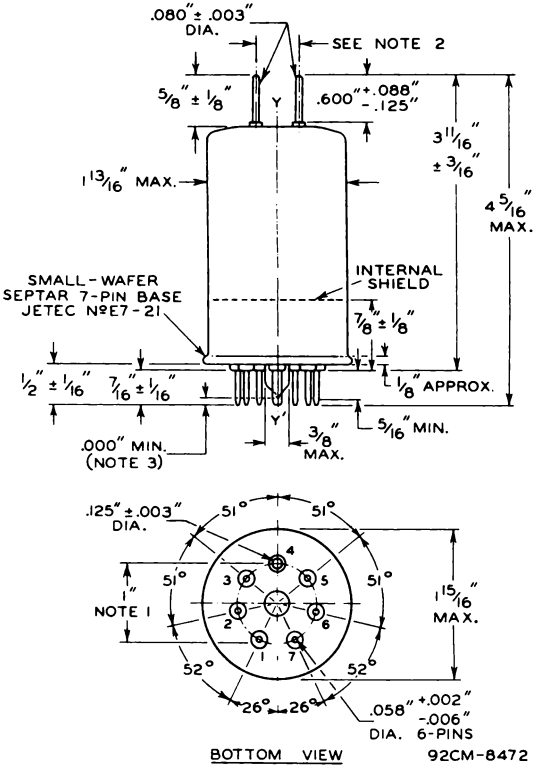
TWIN BEAM POWER TUBE

OPERATING CONSIDERATIONS

Shielding of the 5894 in rf service is required for stable operation. A convenient method of shielding is to mount the socket approximately 7/8" beneath a hole in the chassis plate so that when the 5894 is inserted in the socket, the internal shield (see *Dimensional Outline*) of the tube will be close to the edge of the hole and in the same plane as the chassis plate. This arrangement provides an effective shield to isolate the grid-No.1 circuits from the plate circuits.



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TWIN BEAM POWER TUBE

THE REFERENCE AXIS YY' IS DEFINED AS THE AXIS OF THE BASE-PIN GAUGE DESCRIBED IN NOTE 1.

NOTE 1: ANGULAR VARIATIONS BETWEEN PINS AND VARIATION IN PIN-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT PINS WILL ENTER TO A DISTANCE OF 3/8" A FLAT-PLATE BASE-PIN GAUGE HAVING SIX HOLES 0.0800" ± 0.0005" AND ONE HOLE 0.1450" ± 0.0005" ARRANGED ON A 1.0000" ± 0.0005" CIRCLE AT SPECIFIED ANGLES WITH TOLERANCE OF ± 5' FOR EACH ANGLE. GAUGE IS ALSO PROVIDED WITH A HOLE 0.500" ± 0.010" CONCENTRIC WITH PIN CIRCLE WHOSE CENTER IS ON THE AXIS YY'.

NOTE 2: THE PLATE LEADS WILL ENTER A FLAT-PLATE PLATE-LEAD GAUGE HAVING THICKNESS OF 3/8" AND HAVING TWO HOLES 0.1400" ± 0.0005" WHOSE CENTERS ARE LOCATED AT A DISTANCE OF 0.275" ± 0.001" FROM THE AXIS YY' AND WHOSE AXES ARE PARALLEL TO YY'. THE PLANE THROUGH THESE AXES WILL BE 90° ± 5' FROM THE PLANE THROUGH YY' AND PIN No. 4.

NOTE 3: EXHAUST TIP WILL NOT EXTEND BEYOND THE PLANE WHICH PASSES THROUGH THE ENDS OF THE THREE LONGEST PINS.

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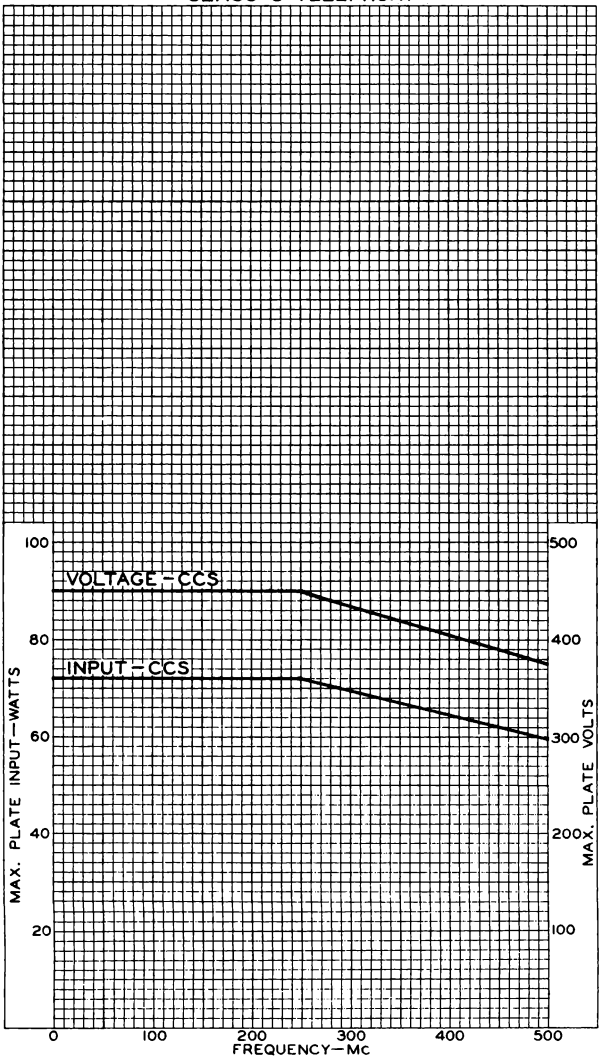
RATING CHART I
CLASS C TELEPHONY



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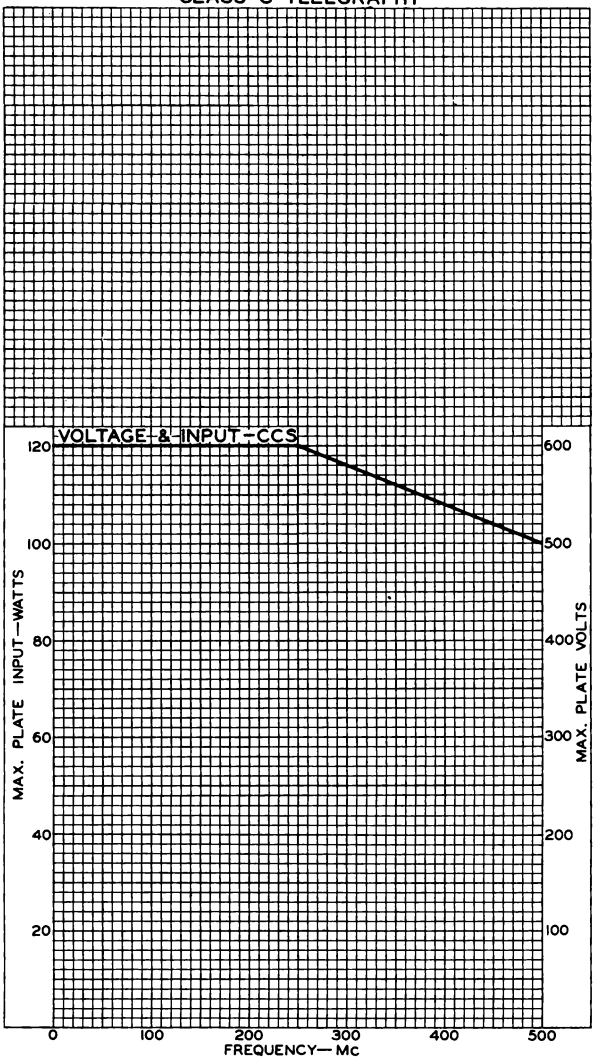
RATING CHART II
CLASS C TELEGRAPHY



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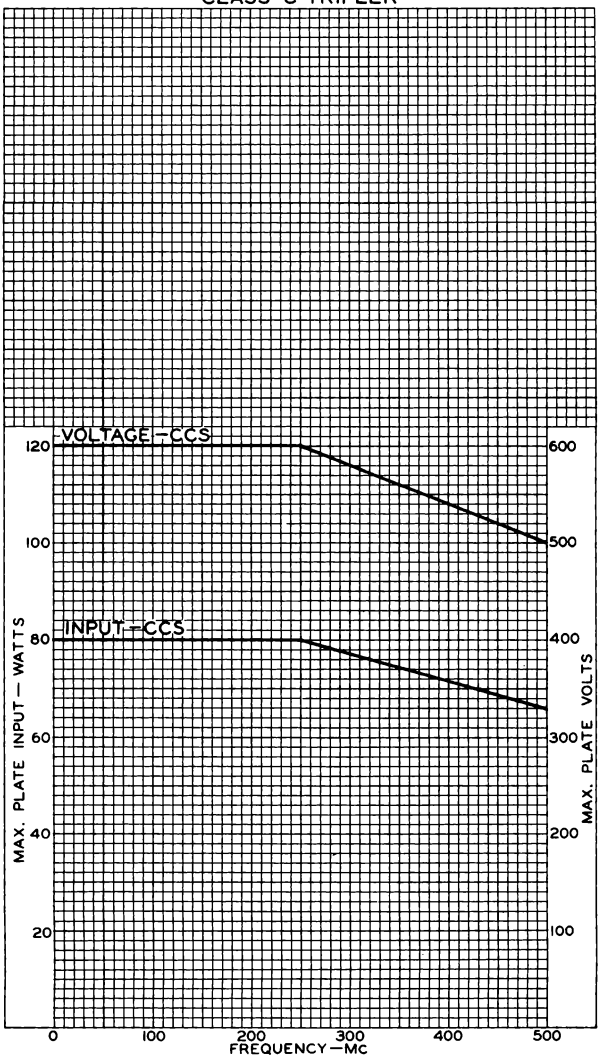
RATING CHART III
CLASS C TRIPLER



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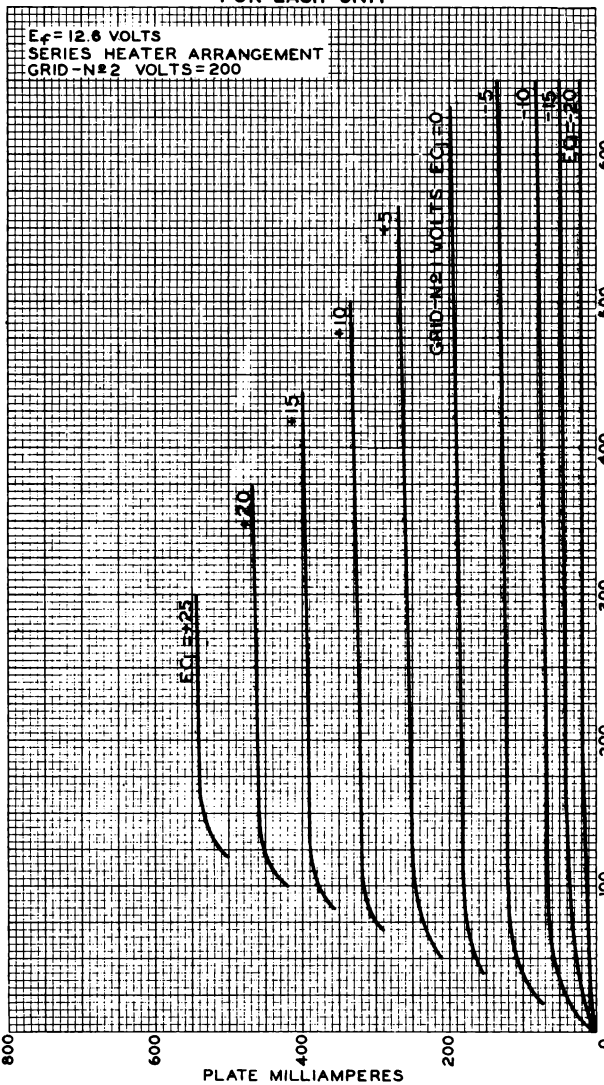
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



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92CM-8474

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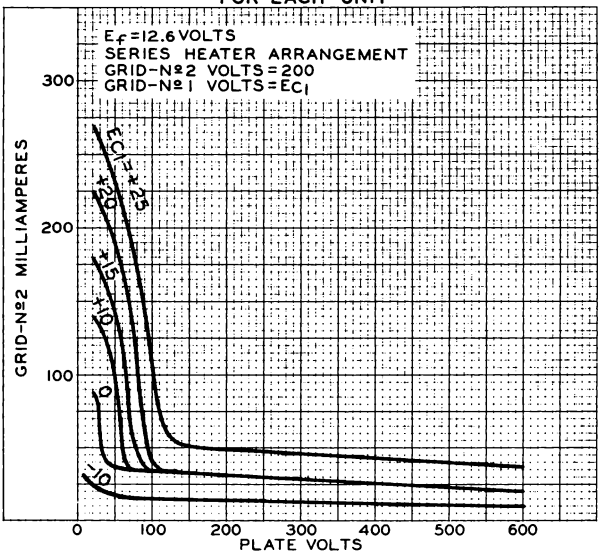
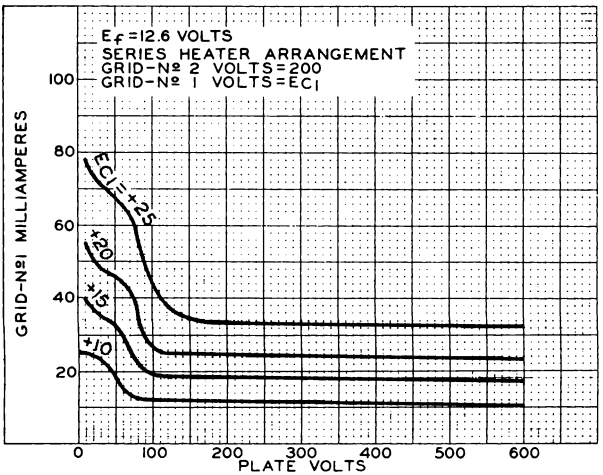
AVERAGE CHARACTERISTICS
FOR EACH UNIT





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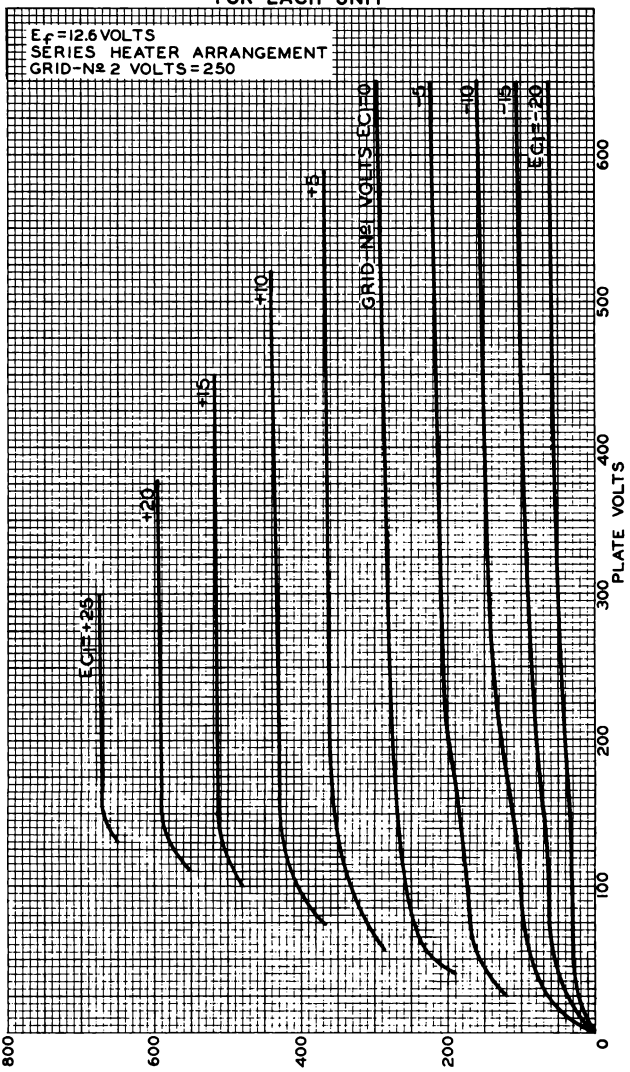
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



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92CM-8473

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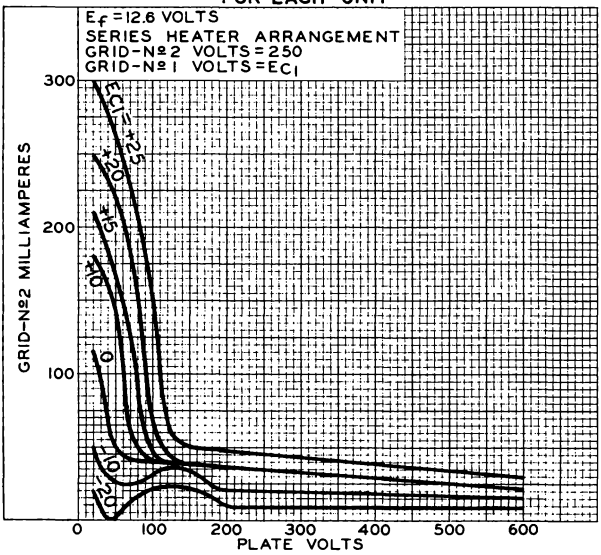
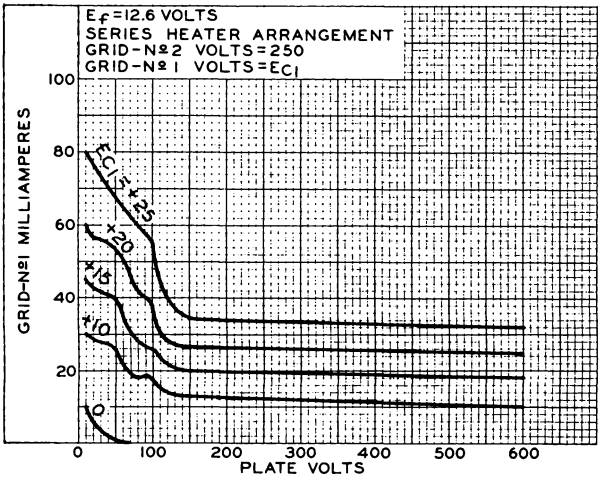
AVERAGE CHARACTERISTICS
FOR EACH UNIT





5946

POWER TRIODE

FORCED-AIR COOLED, GROUNDED-GRID TYPE

For μhf plate-pulsed oscillator and amplifier service

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	3.4	amp
Minimum Heating Time	1	minute
Amplification Factor	27	
Direct Interelectrode Capacitances:		
Grid to Plate	6	μμf
Grid to Cathode	11	μμf
Plate to Cathode°	0.32 max.	μμf

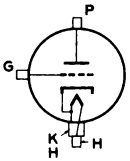
° With external shield connected to grid.

Mechanical:

Terminal Connections:

H - Heater Pin Terminal

K & H - Cathode and Heater Cylindrical Terminal



G - Grid Cylindrical Terminal

P - Plate Contact Surface on Plate Ring

Mounting Position	Vertical, with radiator up or down
Overall Length	3-5/16" ± 3/32"
Maximum Diameter	1.750" ± 0.010"
Radiator	Integral Part of Tube
Mounting	Special

Air Flow:

The specified air flow for various plate dissipations, as indicated in the tabulation below, should be delivered by a blower onto the respective terminals and seals, and through the radiator before and during the application of any voltages. Heater power, plate power, and air may be removed simultaneously.

Plate Dissipation	150	200	250	watts
Min. Air Flow	5.7	10	16	cfm
Static Pressure	0.16	0.4	0.85	in. of water

The above flow and pressure values are for condition with radiator temperature held constant at 135°C rise above ambient temperature. The air flow must be adequate to limit the temperature of the radiator, grid terminal, cathode terminal, and seals to their respective maximum values.

Radiator Temperature (Measured on core at end adjacent to plate ring)	180 max.	°C
Grid-Terminal Temperature	150 max.	°C
Cathode-Terminal Temperature	150 max.	°C
Seal Temperature (Plate, grid, and cathode)	150 max.	°C

(continued on next page)

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POWER TRIODE

PLATE-PULSED OSCILLATOR & AMPLIFIER—Class C

Maximum Ratings, ***Absolute Values*****:**

For a maximum pulse duration of 5 microseconds*

PEAK POSITIVE-PULSE PLATE-SUPPLY VOLTAGE	7500 max.	volts
PEAK NEGATIVE-PULSE GRID-BIAS VOLTAGE	600 max.	volts
PEAK PLATE CURRENT FROM PULSE SUPPLY	4.5 max.	amp
PEAK RECTIFIED GRID CURRENT	1.0 max.	amp
DC PLATE CURRENT	0.045 max.	amp
DC GRID CURRENT	0.010 max.	amp
PLATE DISSIPATION	250 max.	watts

Typical Operation with Rectangular Wave Shape in Oscillator Circuit at 1250 Mc:

*With duty factor** of 0.01*

Peak Positive-Pulse Plate-Supply Voltage	5500	7500	volts
Peak Negative-Pulse Grid-Bias Voltage	375	500	volts
Cathode Resistor▲	100	100	ohms
Peak RF Grid Voltage	625	850	volts
Peak Plate Current From Pulse Supply	3.5	4.5	amp
Peak Rectified Grid Current	0.25	0.5	amp
DC Plate Current	0.035	0.045	amp
DC Grid Current	0.0025	0.005	amp
Useful Power Output at Peak of Pulse■ (Approx.)	8000	14000	watts

* Pulse duration is defined as the time interval between the two points on the pulse at which the instantaneous value is 70% of the peak value. The peak value is defined as the maximum value of a smooth curve through the average of the fluctuations over the top portion of the pulse. The magnitude of any spike on the plate voltage pulse should not exceed a value of 8500 volts with respect to cathode and its duration should not exceed 0.5 microsecond measured at the peak-pulse-value level.

** Duty factor is the product of pulse duration and repetition rate. For variable pulse durations and pulse repetition rates, the duty factor is defined as the ratio of time "on" to total elapsed time in any 500-microsecond interval.

▲ It is recommended that the entire bias be obtained from a cathode resistor. In certain applications, partial grid-resistor bias may be used.

■ The power output at peak of pulse is obtained from the average power output using the duty factor of the peak power output pulse. This procedure is necessary since the power output pulse duty factor may be less than the applied voltage pulse duty factor because of a delay in the start of rf power output.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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POWER TRIODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Min.*	
Heater Current	1	3.05	3.75	amp
Amplification Factor	1,2	20	34	
Grid-Plate Capacitance . . .	–	5.5	6.5	μμf
Grid-Cathode Capacitance . .	–	9.6	12.4	μμf
Plate-Cathode Capacitance. .	3	–	0.32	μμf
Plate Voltage.	1,4	550	810	volts
Plate Voltage.	1,5	750	1150	volts
Grid Voltage	1,6	–	-125	volts
Peak Cathode Current	1,7	12	–	amp
Useful Power Output at Peak of Pulse	1,8	12	–	kw

Note 1: With 6.3 volts on heater.

Note 2: With dc grid voltage of -15 volts, and dc plate voltage adjusted to give dc plate current of 250 milliamperes.

Note 3: With external shield connected to grid terminal.

Note 4: With dc grid voltage of -10 volts, and dc plate voltage adjusted to give dc plate current of 250 milliamperes.

Note 5: With dc plate voltage of -20 volts, and dc plate voltage adjusted to give dc plate current of 250 milliamperes.

Note 6: With dc plate voltage of 1250 volts, and dc grid voltage adjusted to give dc plate current of 1.0 milliampere.

Note 7: Represents the maximum value of cathode current (plate current and grid current) for the tube under any condition of operation.

Note 8: With peak positive-pulse plate-supply voltage of 7500 volts, cathode-bias resistor of 100 ± 10% ohms, peak plate current from pulse supply of 4.5 amperes, peak rectified grid current of 0.5 ampere, duty factor of 0.01, and frequency of 1250 Mc.

Data on operating frequencies for the 5946 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

Outline Drawing and Mounting Arrangement for the 5946 are the same as for Type 5588

OPERATING NOTES

Rated heater voltage should be applied for at least one minute to allow the cathode to reach normal operating temperature before voltages are applied to the other electrodes. In circuits where the plate is grounded and the negative pulse is applied to the cathode, the heater supply must be insulated to withstand the peak positive-pulse plate-supply voltage, and it should also present a minimum amount of capacitance loading to the pulse-supply source.

5946

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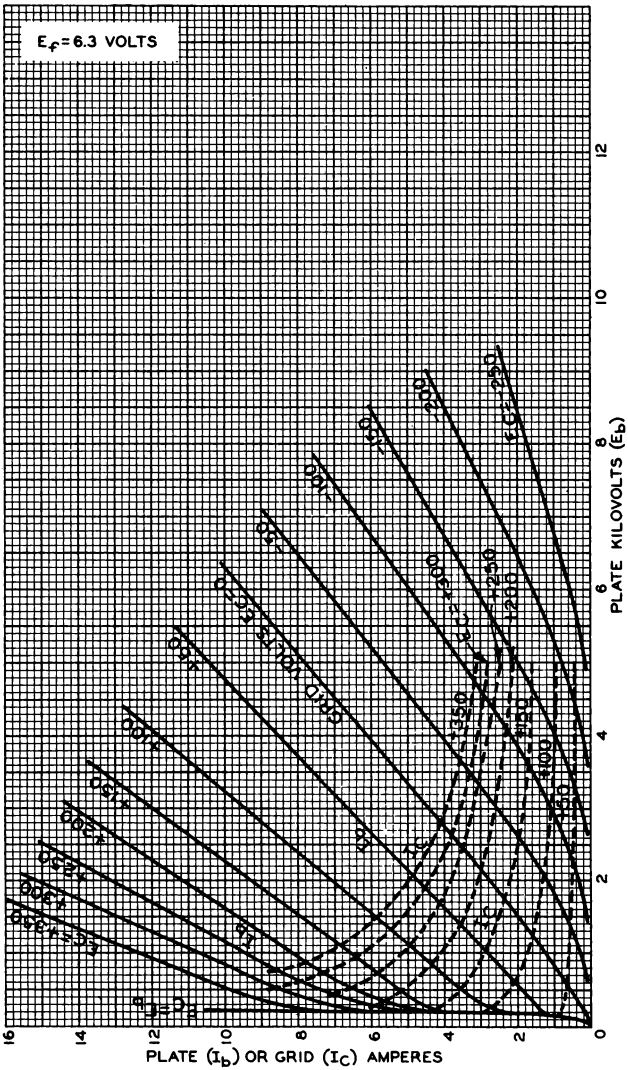
AVERAGE CHARACTERISTICS



OCT. 17, 1950 TUBE DEPARTMENT 92CM-7555

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6146

VHF BEAM POWER TUBE

GENERAL DATA

Electrical:

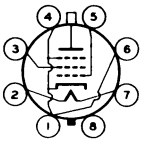
Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	1.25	amp
Transconductance, for plate volts = 200, grid-No.2 volts = 200, and plate ma. = 100	7000	μmhos
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 200, grid-No.2 volts = 200, and plate ma. = 100	4.5	
Direct Interelectrode Capacitances:*		
Grid No.1 to Plate	0.22 max.	μμf
Input	13.5	μμf
Output	8.5	μμf

Mechanical:

Mounting Position	Any
Overall Length	3-11/16" ± 1/8"
Seated Length	3-1/8" ± 1/8"
Maximum Diameter	1-23/32"
Bulb	T-12
Cap	Small (JETEC No.C1-1)
Base	Large-Micanol-Wafer Octal 8-Pin with Sleeve (JETEC No.B8-86)

BOTTOM VIEW

Pin 1 - Cathode, Grid No.3, Internal Shield
Pin 2 - Heater
Pin 3 - Grid No.2



Pin 4 - Same as Pin 1
Pin 5 - Grid No.1
Pin 6 - Same as Pin 1
Pin 7 - Heater
Pin 8 - Base Sleeve
Cap - Plate

Bulb Temperature (At hottest point) . . . . . 220 max. °C

AF POWER AMPLIFIER & MODULATOR--Class AB1†

Triode Connection--Grid No.2 Connected to Plate

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	400 max.	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT**	90 max.	90 max.	ma
MAX.-SIGNAL PLATE INPUT**	35 max.	35 max.	watts
PLATE DISSIPATION**	20 max.	25 max.	watts

* With no external shielding and base sleeve connected to ground.

†,●,●●,**: See next page.

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VHF BEAM POWER TUBE

	CCS●	ICAS●●	
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode . . .	135 max.	135 max.	volts
Heater positive with respect to cathode . . .	135 max.	135 max.	volts

→ **Typical Operation:**

Values are for 2 tubes

DC Plate Voltage	250	400	400	volts
DC Grid-No.1 Voltage	-50	-100	-100	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage○	100	200	200	volts
Zero-Signal DC Plate Current.	120	40	40	ma
Max.-Signal DC Plate Current.	125	100	100	ma
Effective Load Resistance (Plate to plate)	5000	8000	8000	ohms
Max.-Signal Driving Power (Approx.).	0	0	0	watts
Max.-Signal Power Output (Approx.)	10	22	22	watts

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance:○○		
With fixed bias.	0.1 max.	megohm
With cathode bias.	0.5 max.	megohm

AF POWER AMPLIFIER & MODULATOR--Class AB_1†

Maximum Ratings, *Absolute Values:*

	CCS●	ICAS●●	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	250 max.	250 max.	volts
MAX.-SIGNAL DC PLATE CURRENT**.	125 max.	135 max.	ma
MAX.-SIGNAL PLATE INPUT**. .	60 max.	85 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT**	3 max.	3 max.	watts
PLATE DISSIPATION**.	20 max.	25 max.	watts

† Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

○ The driver stage should be capable of supplying the No.1 grids of the class AB_1 stage with the specified driving voltage at low distortion.

●, ●●, **, ○○: See next page. → Indicates a change

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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VHF BEAM POWER TUBE

	CCS●	ICAS●●	
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts

Typical CCS Operation: ←

Values are for 2 tubes

DC Plate Voltage	400	500	600	volts
DC Grid-No.2 Voltage▲	190	185	180	volts
DC Grid-No.1(Control-Grid)Voltage:				
With fixed-bias source	-40	-40	-45	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage.	80	80	90	volts
Zero-Signal DC Plate Current . . .	63	57	26	ma
Max.-Signal DC Plate Current . . .	228	215	200	ma
Zero-Signal DC Grid-No.2 Current .	2.5	2	1	ma
Max.-Signal DC Grid-No.2 Current .	25	25	23	ma
Effective Load Resistance (Plate to plate)	4000	5500	7000	ohms
Max.-Signal Driving Power (Approx.).	0	0	0	watts
Max.-Signal Power Output (Approx.)	55	70	82	watts

Typical ICAS Operation: ←

Values are for 2 tubes

DC Plate Voltage	600	750	volts
DC Grid-No.2 Voltage▲	200	195	volts
DC Grid-No.1 (Control-Grid) Voltage:			
From fixed-bias source	-50	-50	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage.	100	100	volts
Zero-Signal DC Plate Current	28	23	ma
Max.-Signal DC Plate Current	229	220	ma
Zero-Signal DC Grid-No.2 Current . . .	1	1	ma
Max.-Signal DC Grid-No.2 Current . . .	27	26	ma
Effective Load Resistance (Plate to plate)	6000	8000	ohms
Max.-Signal Driving Power (Approx.) .	0	0	watts
Max.-Signal Power Output (Approx.) . .	95	120	watts

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance:○○		
With fixed bias.	0.1 max.	megohm
With cathode bias.	Not recommended	

●,●●,**,○○,▲:See next page. ← Indicates a change

RCA

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VHF BEAM POWER TUBE

AF POWER AMPLIFIER & MODULATOR--Class AB_2#

Maximum Ratings, *Absolute Values*:

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE. . .	250 max.	250 max.	volts
MAX.-SIGNAL DC PLATE CURRENT**. . .	125 max.	135 max.	ma
MAX.-SIGNAL PLATE INPUT**. .	62.5 max.	90 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT**. . .	3 max.	3 max.	watts
PLATE DISSIPATION**.	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode. . .	135 max.	135 max.	volts
Heater positive with respect to cathode. . .	135 max.	135 max.	volts

→ **Typical CCS Operation:**

Values are for 2 tubes

DC Plate Voltage	400	500	600	volts
DC Grid-No.2 Voltage▲	175	175	165	volts
DC Grid-No.1 (Control-Grid) Voltage:				
From fixed-bias source	41	44	44	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage.	95	102	97	volts
Zero-Signal DC Plate Current . . .	33	27	22	ma
Max.-Signal DC Plate Current . . .	232	242	207	ma
Zero-Signal DC Grid-No.2 Current .	1.1	0.7	0.6	ma
Max.-Signal DC Grid-No.2 Current .	18	18	17	ma
Max.-Signal DC Grid-No.1 Current .	1.6	1.9	1.1	ma
Effective Load Resistance (Plate to plate).	3700	4600	6800	ohms
Max.-Signal Driving Power (Approx.)♦	0.2	0.3	0.2	watt
Max.-Signal Power Output (Approx.)	62	83	90	watts

** Averaged over any audio-frequency cycle of sine-wave form.

∞ The type of input-coupling network used should not introduce too much resistance in the grid-No.1 circuit. Transformer or impedance coupling devices are recommended. When grid No.1 is operated in the negative region with fixed bias, the dc grid-No.1-circuit resistance should not exceed the specified value of 0.1 megohm. For higher values of dc grid-No.1-circuit resistance, cathode bias is required. Under no circumstances should the total dc grid-No.1-circuit resistance exceed the specified value of 0.5 megohm.

Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

●,●●,▲,♦: See next page. → Indicates a change

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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VHF BEAM POWER TUBE

Typical ICAS Operation: ←

Values are for 2 tubes

DC Plate Voltage	600	750	volts
DC Grid-No.2 Voltage▲	190	165	volts
DC Grid-No.1 (Control-Grid) Voltage: *From fixed-bias source*	-48	-46	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	109	108	volts
Zero-Signal DC Plate Current	28	22	ma
Max.-Signal DC Plate Current	270	240	ma
Zero-Signal DC Grid-No.2 Current	1.2	0.3	ma
Max.-Signal DC Grid-No.2 Current	20	20	ma
Max.-Signal DC Grid-No.1 Current	2	2.6	ma
Effective Load Resistance (Plate to plate)	5000	7400	ohms
Max.-Signal Driving Power (Approx.)♦	0.03	0.04	watt
Max.-Signal Power Output (Approx.)	113	131	watts

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance:♦		
With fixed bias	30000 max.	ohms
With cathode bias	Not recommended	

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values*:			
DC PLATE VOLTAGE	480 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-150 max.	-150 max.	volts
DC PLATE CURRENT	117 max.	125 max.	ma
DC GRID-No.1 CURRENT	3.5 max.	4.0 max.	ma
PLATE INPUT	45 max.	67.5 max.	watts
GRID-No.2 INPUT	2 max.	2 max.	watts
PLATE DISSIPATION	13.3 max.	16.7 max.	watts

▲ Preferably obtained from a separate source or from the plate-voltage supply with a voltage divider.

♦ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the AB_2 stage. To minimize distortion, the effective resistance per grid-No.1 circuit of the AB_2 stage should be held at a low value. For this purpose, the use of transformer coupling is recommended. In no case, however, should the total dc grid-No.1-circuit resistance exceed 30000 ohms when the 6146 is operated at maximum ratings. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100000 ohms.

●, ●●: See next page. ← Indicates a change

6146

VHF BEAM POWER TUBE

	CCS●		ICAS●●	
PEAK HEATER-CATHODE VOLTAGE:				
Heater negative with respect to cathode .	135 max.		135 max.	volts
Heater positive with respect to cathode .	135 max.		135 max.	volts
→ **Typical Operation:**				
DC Plate Voltage	400	475	600	volts
DC Grid-No.2 Voltage♦. .	150	135	150	volts
From a series resistor of. .	33000	51000	56000	ohms
DC Grid-No.1 Voltage★. .	-87	-77	-87	volts
From a grid resistor of	27000	27000	27000	ohms
Peak RF Grid-No.1 Voltage	107	95	107	volts
DC Plate Current	112	94	112	ma
DC Grid-No.2 Current . .	7.8	6.4	7.8	ma
DC Grid-No.1 Current (Approx.). .	3.4	2.8	3.4	ma
Driving Power (Approx.).	0.4	0.3	0.4	watt
Power Output (Approx.) .	32	34	52	watts

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance‡.	30000 max.	ohms

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy□
and
RF POWER AMPLIFIER--Class C FM Telephony

	CCS●	ICAS●●	
Maximum Ratings, ***Absolute Values*****:**			
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE. .	250 max.	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. .	-150 max.	-150 max.	volts
DC PLATE CURRENT	140 max.	150 max.	ma
DC GRID-No.1 CURRENT . .	3.5 max.	4.0 max.	ma
PLATE INPUT.	67.5 max.	90 max.	watts
GRID-No.2 INPUT.	3 max.	3 max.	watts
PLATE DISSIPATION. . . .	20 max.	25 max.	watts

♦ Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate supply through a series resistor.

★ Obtained from grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

□ Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●, ●●, ‡: See next page. → Indicates a change

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VHF BEAM POWER TUBE

	CCS•		ICAS••		
PEAK HEATER-CATHODE VOLTAGE:					
Heater negative with respect to cathode .	135 max.		135 max.		volts
Heater positive with respect to cathode .	135 max.		135 max.		volts
Typical Operation as Amplifier up to 60 Mc:					←
DC Plate Voltage	500	600	600	750	volts
DC Grid-No.2 Voltage•• .	170	150	180	160	volts
From a series resistor of. .	36000	51000	43000	56000	ohms
DC Grid-No.1 Voltage■. .	-66	-58	-71	-62	volts
From a grid-No.1 resistor of. .	27000	20000	24000	20000	ohms
From a cathode resistor of. .	470	470	430	470	ohms
Peak RF Grid-No.1 Voltage	84	73	91	79	volts
DC Plate Current	135	112	150	120	ma
DC Grid-No.2 Current . .	9	9	10	11	ma
DC Grid-No.1 Current . . (Approx.). .	2.5	2.8	2.8	3.1	ma
Driving Power (Approx.).	0.2	0.2	0.3	0.2	watt
Power Output (Approx.) .	48	52	66	70	watts

Typical Operation as Amplifier at 175 Mc:			←
DC Plate Voltage	320	400	volts
DC Grid-No.2 Voltage••	180	190	volts
From a series resistor of. .	13000	20000	ohms
DC Grid-No.1 Voltage■	-51	-54	volts
From a grid resistor of. . .	27000	24000	ohms
From a cathode resistor of .	330	330	ohms
Peak RF Grid-No.1 Voltage. . .	64	68	volts
DC Plate Current	140	150	ma
DC Grid-No.2 Current	10	10.4	ma
DC Grid-No.1 Current (Approx.).	2	2.2	ma
Driving Power (Approx.). . . .	3	3	watts
Power Output (Approx.)	25	35	watts

• Continuous Commercial Service.

•• Intermittent Commercial and Amateur Service.

••• Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should be used only when the 6146 is used in a circuit which is not keyed. Grid-No.2 voltage must not exceed 400 volts under key-up conditions.

■ Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

‡: See next page. ← Indicates a change

6146

VHF BEAM POWER TUBE

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance‡ . . . . . 30000 max. ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	1.175	1.325	amp
Grid-No.1-to-Plate Capacitance.	2	–	0.22	μμf
Input Capacitance.	2	11.1	15.9	μμf
Output Capacitance	2	6.4	10.6	μμf
→ Plate Current.	3	46	94	ma
→ Grid-No.2 Current.	3	–	5.5	ma
→ Useful Power Output.	4	47	–	watts

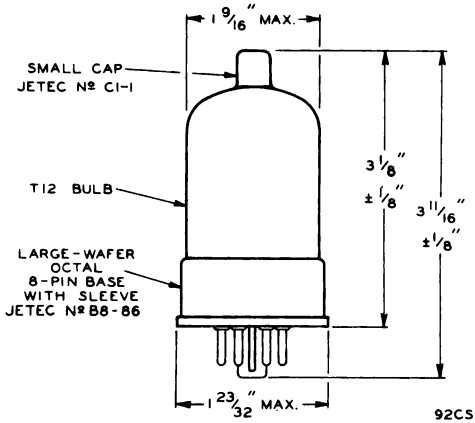
Note 1: With 6.3 volts ac on heater.

Note 2: With no external shield. Base sleeve (pin No.8) is grounded.

Note 3: With 6.3 volts ac on heater, dc plate voltage of 300 volts, dc grid-No.2 voltage of 200 volts, and dc grid-No.1 voltage of -33 volts.

Note 4: In a single-tube self-excited oscillator circuit, and with 6.3 volts ac on heater, dc plate voltage of 600 volts, dc grid-No.2 voltage of 180 volts, grid-No.1 resistor of 0.030 ± 10% megohm, max. dc plate current of 100 ma. to 112 ma., dc grid-No.1 current of 2 to 2.5 ma., and frequency of 15 Mc.

‡ When grid No.1 is driven positive and the 6146 is operated at maximum ratings, the total dc grid-No.1-circuit resistance should not exceed the specified value of 30000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100000 ohms.



92CS-7700R1

→ Indicates a change.

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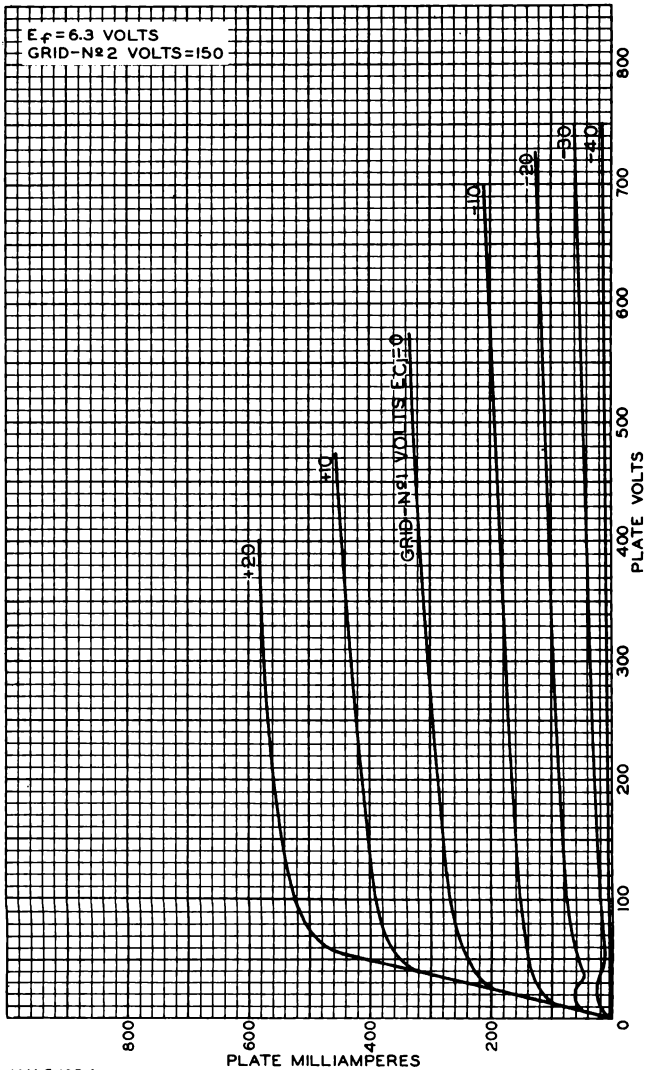
6146

AVERAGE PLATE CHARACTERISTICS



JAN.5,1954

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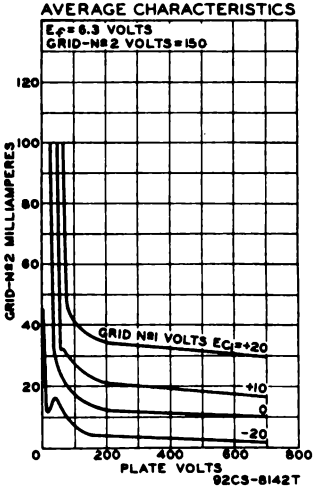
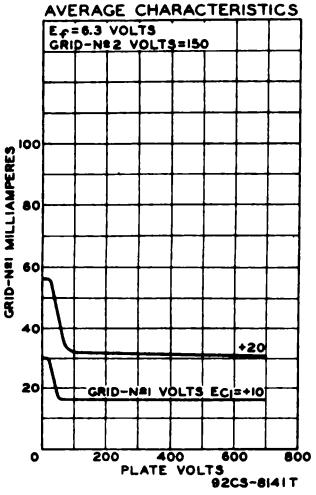
92CM-8145

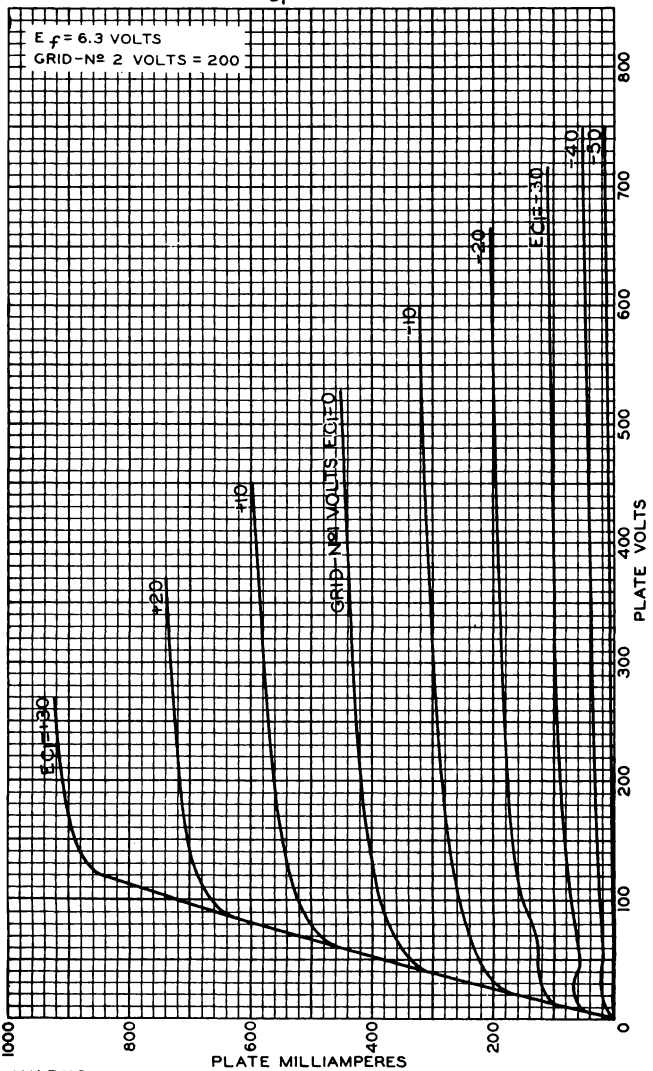
6146
CHARACTERISTICS CURVES





6146

6146
AVERAGE PLATE CHARACTERISTICS
WITH E_{C1} AS VARIABLE



JAN.7,1954

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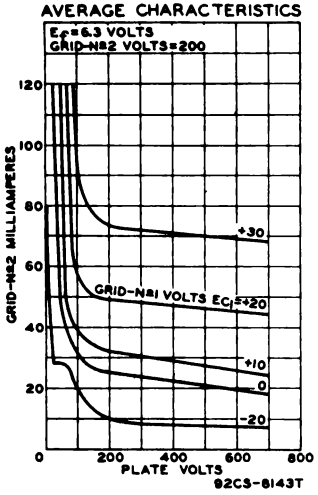
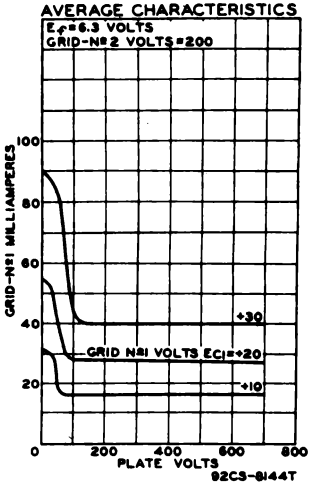
92CM-7707R1

6146

CHARACTERISTICS CURVES





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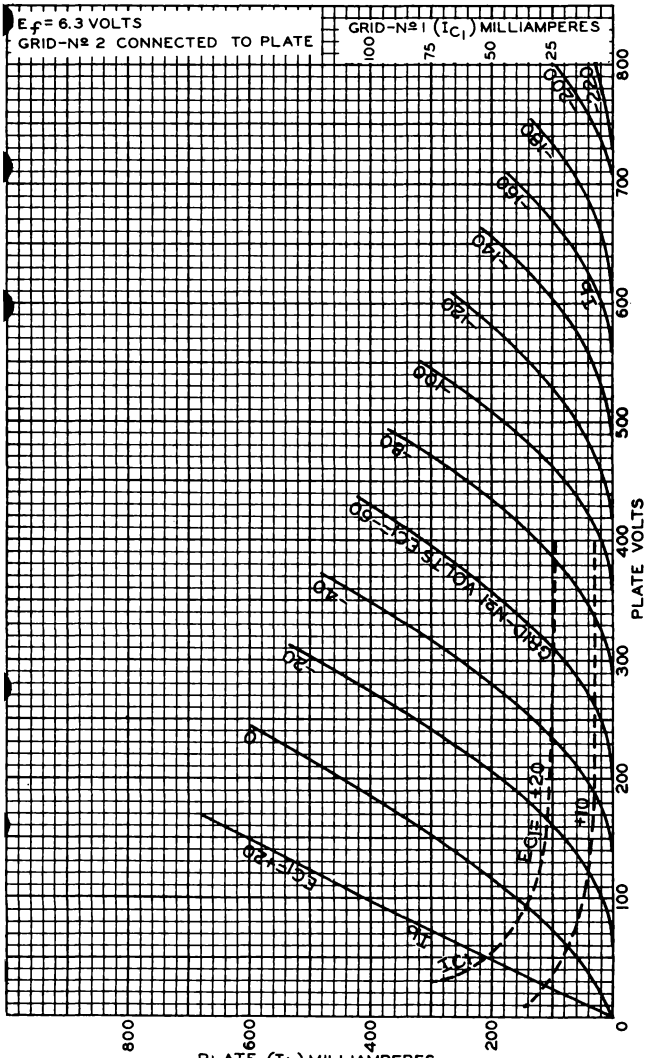
AVERAGE CHARACTERISTICS
TRIODE CONNECTION



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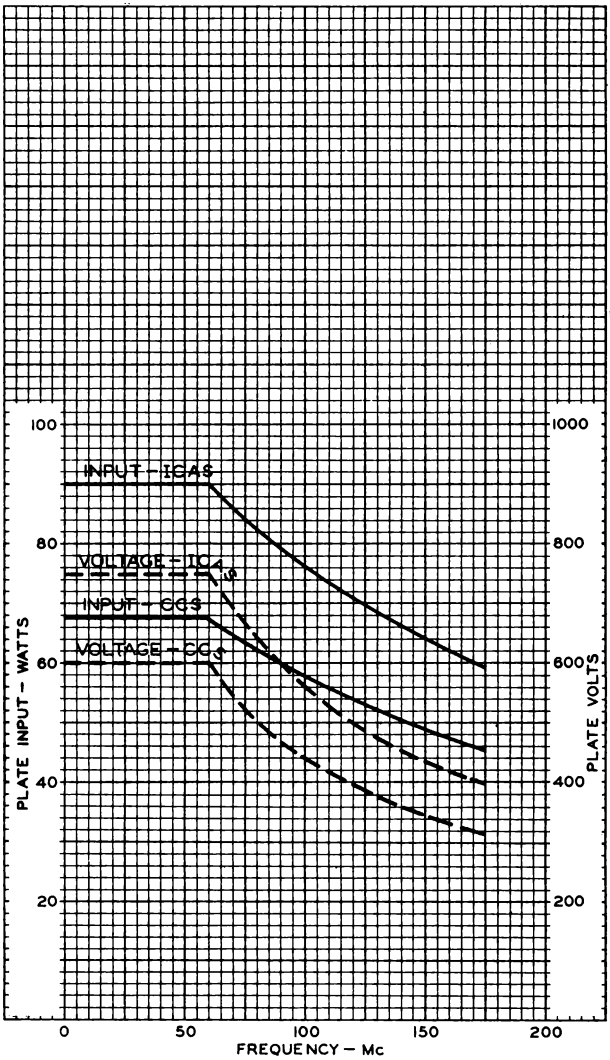
92CM-7711R1

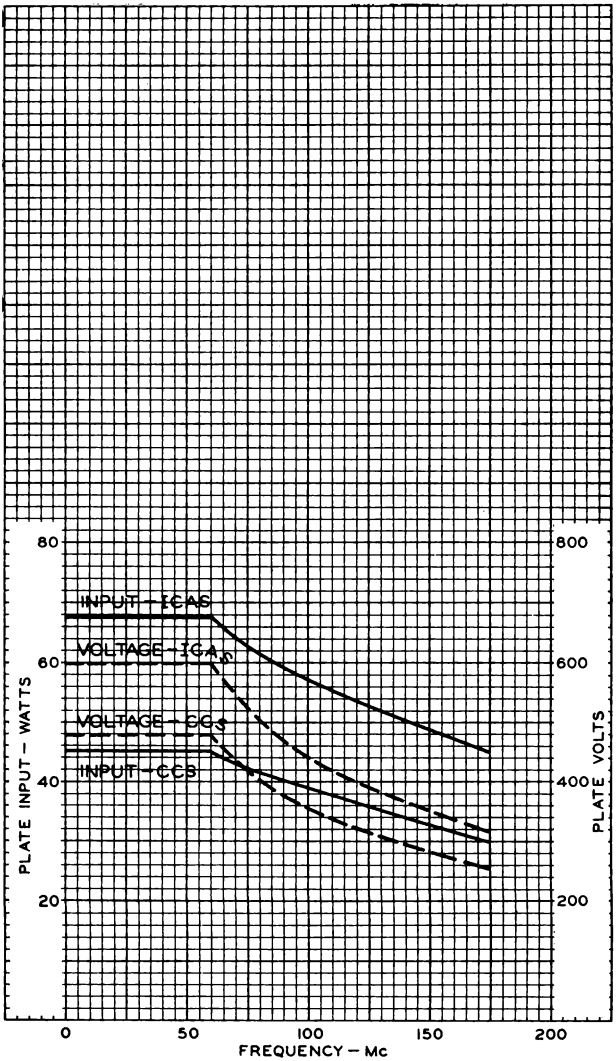
6146

MAXIMUM RATINGS vs OPERATING FREQUENCY

CLASS C TELEGRAPHY



6146
MAXIMUM RATINGS vs OPERATING FREQUENCY
CLASS C TELEPHONY



6159

6159

VHF BEAM POWER AMPLIFIER

Heater, for Unipotential Cathode:

Voltage.	26.5 ±10%	ac or dc volts
Current.	0.3	amp

The 6159 is the same as the 6146 except for heater rating.

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6161

UHF POWER TRIODE

FORCED-AIR COOLED

Particularly suitable for cathode-drive circuits

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

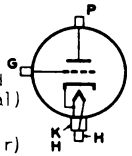
Voltage*	6.3 av.	ac or dc volts
	6.9 max.	volts
Current	3.4	amp
Minimum Heating Time	1	minute
Amplification Factor	27	
Direct Interelectrode Capacitances:		
Grid to Plate	6	μμf
Grid to Cathode	11	μμf
Plate to Cathode♦	0.32 max.	μμf

Mechanical:

Terminal Connections:

H - HEATER TERMINALS (Center Pin at Cathode End and Cathode Terminal)

K - CATHODE TERMINAL (End Opposite Rad'r)



G - GRID TERMINAL (Between Ring of Radiator and Cath. Terminal)

P - PLATE TERMINAL (Ring of Radiator)

Mounting Position	Any
Overall Length	3-5/16" ± 3/32"
Greatest Diameter	1.750" ± 0.010"
Radiator	Integral part of tube
Mounting	Special

Air Flow:

The specified air flow for various plate dissipations, as indicated in the tabulation below, should be delivered by a blower onto the respective terminals and seals, and through the radiator before and during the application of any voltages. Heater power, plate power, and air may be removed simultaneously.

Percentage of Max. Rated Plate Dissipation for Each Class of Service	100	80	60	per cent
Minimum Air Flow	16	10	5.7	cfm
Static Pressure	0.85	0.4	0.16	in. of water

The above flow and pressure values are for condition with radiator temperature held constant at 135°C rise above incoming-air temperature. The air flow must be adequate to limit the temperature of the radiator, grid terminal, cathode terminal, and seals to their respective maximum values.

Radiator Temperature (Measured on core at end adjacent to plate ring)	180 max.	°C
Grid-Terminal Temperature	150 max.	°C

* Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

♦ With external flat shield 7-1/2" min. diameter located in plane of the grid terminal and perpendicular to axis of tube. Shield is connected to grid terminal.

6161
UHF POWER TRIODE

Cathode-Terminal Temperature	150 max.	°C
Seal Temperature (Plate, grid, and cathode).	150 max.	°C

RF POWER AMPLIFIER--Class B Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	1600 max.	volts
DC PLATE CURRENT	0.350 max.	amp
DC GRID CURRENT	0.100 max.	amp
PLATE INPUT	560 max.	watts
PLATE DISSIPATION	250 max.	watts

Typical Operation in Cathode-Drive Circuit at 600 Mc:

Bandwidth♦ of 6 Mc

DC Plate-to-Grid Voltage.	1600	volts
DC Cathode-to-Grid Voltage.	100	volts
Peak RF Cathode-to-Grid Voltage:		
Synchronizing Level	130	volts
Pedestal Level	117	volts
DC Plate Current:		
Synchronizing Level	0.350	amp
Pedestal Level	0.285	amp
DC Grid Current (Approx.):		
Synchronizing Level	0.040	amp
Pedestal Level.	0.013	amp
Driver Power Output (Approx.):♣		
Synchronizing Level	65#	watts
Pedestal Level.	40	watts
Output-Circuit Efficiency (Approx.) . . .	89	per cent
Useful Power Output (Approx.):		
Synchronizing Level	325●●	watts
Pedestal Level.	195●●	watts

Typical Operation in Cathode-Drive Circuit at 900 Mc:

Bandwidth♦ of 6 Mc

DC Plate-to-Grid Voltage.	1600	volts
DC Cathode-to-Grid Voltage.	100	volts
Peak RF Cathode-to-Grid Voltage:		
Synchronizing Level	135	volts
Pedestal Level.	120	volts
DC Plate Current:		
Synchronizing Level	0.350	amp
Pedestal Level.	0.280	amp

●,♦,♣,#,●●: See next page.

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UHF POWER TRIODE

DC Grid Current (Approx.):		
Synchronizing Level	0.030	amp
Pedestal Level	0.010	amp
Driver Power Output (Approx.):♣		
Synchronizing Level	75⊕	watts
Pedestal Level	45	watts
Output-Circuit Efficiency (Approx.)	65	per cent
Useful Power Output (Approx.):		
Synchronizing Level	230●●	watts
Pedestal Level	135●●	watts

BIAS-MODULATED RF POWER AMPLIFIER--Class C Television Service

Synchronizing - level conditions per tube unless otherwide specified

Maximum CCS⊕ Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1600 max.	volts
DC GRID VOLTAGE (White level)	-300 max.	volts
DC PLATE CURRENT	0.350 max.	amp
DC GRID CURRENT	0.100 max.	amp
PLATE INPUT	560 max.	watts
PLATE DISSIPATION	250 max.	watts

Typical Operation in Cathode-Drive Circuit at 600 Mc:

	Bandwidth♦ of 6 Mc	
DC Plate-to-Grid Voltage	1600	volts
DC Cathode-to-Grid Voltage:		
Synchronizing Level	100	volts
Pedestal Level	150	volts
White Level	230	volts
Peak RF Cathode-to-Grid Voltage	130	volts
DC Plate Current:		
Synchronizing Level	0.350	amp
Pedestal Level	0.250	amp
DC Grid Current (Approx.):		
Synchronizing Level	0.040	amp
Pedestal Level	0.013	amp
Driver Power Output (Approx.):♣		
Synchronizing Level	65#	watts
Output-Circuit Efficiency (Approx.)	89	per cent
Useful Power Output (Approx.):		
Synchronizing Level	325●●	watts
Pedestal Level	195●●	watts

Typical Operation in Cathode-Drive Circuit at 900 Mc:

	Bandwidth♦ of 6 Mc	
DC Plate-to-Grid Voltage	1600	volts

This value includes 24 watts of circuit loss and 36 watts added to plate input.

●,♦,♣,●●,⊕: See next page.

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UHF POWER TRIODE

DC Cathode-to-Grid Voltage:		
Synchronizing Level	100	volts
Pedestal Level	150	volts
White Level	230	volts
Peak RF Cathode-to-Grid Voltage	135	volts
DC Plate Current:		
Synchronizing Level	0.350	amp
Pedestal Level	0.250	amp
DC Grid Current (Approx.):		
Synchronizing Level	0.030	amp
Pedestal Level	0.010	amp
Driver Power Output (Approx.):♣		
Synchronizing Level	75⊕	watts
Output-Circuit Efficiency (Approx.)	65	per cent
Useful Power Output (Approx.):		
Synchronizing Level	230●●	watts
Pedestal Level	135●●	watts

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1300 max.	volts
DC GRID VOLTAGE	-300 max.	volts
DC PLATE CURRENT	0.210 max.	amp
DC GRID CURRENT	0.075 max.	amp
PLATE INPUT	270 max.	watts
PLATE DISSIPATION	167 max.	watts

Typical Operation in Cathode-Drive Circuit at 600 Mc:

DC Plate-to-Grid Voltage	1400	volts
DC Cathode-to-Grid Voltage	150	volts
From grid resistor of	2150	ohms
Peak RF Cathode-to-Grid Voltage	200	volts
DC Plate Current	0.210	amp
DC Grid Current (Approx.)	0.070	amp
Driver Power Output (Approx.)♣■	70**	watts
Output-Circuit Efficiency (Approx.)	80	per cent
Useful Power Output (Approx.)	180●●	watts

Typical Operation in Cathode-Drive Circuit at 900 Mc:

DC Plate-to-Grid Voltage	1400	volts
DC Cathode-to-Grid Voltage	150	volts
From grid resistor of	2150	ohms
Peak RF Cathode-to-Grid Voltage	200	volts

♦ Computed between half-power points and based on tube output capacitance only.

⊕ This value includes 28 watts of circuit loss and 40 watts added to plate input.

** This value includes 18 watts of circuit loss and 40 watts added to plate input.

●,♣,●●,■: See next page.

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UHF POWER TRIODE

DC Plate Current	0.210	amp
DC Grid Current (Approx.)	0.070	amp
Driver Power Output (Approx.)♣■	75♣	watts
Output-Circuit Efficiency (Approx.)	60	per cent
Useful Power Output (Approx.)	120●●	watts

RF POWER AMPLIFIER & OSC.--Class C Telegraphy□
and
RF POWER AMPLIFIER--Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	1600 max.	volts
DC GRID VOLTAGE	-300 max.	volts
DC PLATE CURRENT	0.250 max.	amp
DC GRID CURRENT	0.075 max.	amp
PLATE INPUT	400 max.	watts
PLATE DISSIPATION	250 max.	watts

Typical Operation as Amplifier in Cathode-Drive Circuit at 600 Mc:

DC Plate-to-Grid Voltage	1650	volts
DC Cathode-to-Grid Voltage:		
From fixed supply of	150	volts
From grid resistor of	3000	ohms
From cathode resistor of	500	ohms
Peak RF Cathode-to-Grid Voltage	200	volts
DC Plate Current	0.250	amp
DC Grid Current (Approx.)	0.050	amp
Driver Power Output (Approx.)♣	75▲	watts
Output-Circuit Efficiency (Approx.)	82	per cent
Useful Power Output (Approx.)	270●●	watts

Typical Operation as Amplifier in Cathode-Drive Circuit at 900 Mc:

DC Plate-to-Grid Voltage	1650	volts
DC Cathode-to-Grid Voltage:		
From fixed supply of	150	volts
From grid resistor of	15000	ohms
From cathode resistor of	575	ohms

♣ This value includes 23 watts of circuit loss and 40 watts added to plate input.

□ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

▲ This value includes 18 watts of circuit loss and 45 watts added to plate input.

■ In cathode-drive, plate-modulated class C rf power amplifier service, the 6161 can be modulated 100% if the rf driver stage is also modulated 100% simultaneously. Care should be taken to insure that the driver-modulation and amplifier-modulation voltages are exactly in phase.

●,♣,●●: See next page.

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Peak RF Cathode-to-Grid Voltage	200	volts
DC Plate Current	0.250	amp
DC Grid Current (Approx.)	0.010	amp
Driver Power Output (Approx.)♣	80†	watts
Output-Circuit Efficiency (Approx.)	60	per cent
Useful Power Output (Approx.)	180●●	watts

FREQUENCY MULTIPLIER--Class C

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	1600 max.	volts
DC GRID VOLTAGE	-300 max.	volts
DC PLATE CURRENT	0.250 max.	amp
DC GRID CURRENT	0.075 max.	amp
PLATE INPUT	400 max.	watts
PLATE DISSIPATION	250 max.	watts

Typical Operation in Cathode-Drive Circuit:

	Doubler to 600 Mc	*Doubler to 900 Mc*	
DC Plate-to-Grid Voltage	1760	1675	volts
DC Cathode-to-Grid Voltage:			
From fixed supply of	260	175	volts
From grid resistor of	5200	8300	ohms
From cathode resistor of	860	645	ohms
Peak RF Cathode-to-Grid Voltage	300	300	volts
DC Plate Current	0.250	0.250	amp
DC Grid Current (Approx.)	0.050	0.021	amp
Driver Power Output (Approx.)♣	125	100	watts
Output-circuit Efficiency (Approx.)	90	80	per cent
Useful Power Output (Approx.)	180●●	140●●	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	3.05	3.75	amp
Amplification Factor	1,2	20	34	

● Continuous Commerical Service.

♣ The driver stage is required to supply tube losses, rf circuit losses, and rf power added to plate input. The driver stage should be designed to provide an excess of power above the indicated value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

●● This value of useful power is measured at load of output circuit having indicated efficiency.

† This value includes 23 watts of circuit loss and 45 watts added to plate input.

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UHF POWER TRIODE

	Note	Min.	Max.	
Grid-Plate Capacitance . . .	-	5.5	6.5	μμf
Grid-Cathode Capacitance . .	-	9.6	12.4	μμf
Plate-Cathode Capacitance. .	3	-	0.32	μμf
Plate Voltage	1,4	550	810	volts
Plate Voltage	1,5	750	1150	volts
Grid Voltage	1,6	-	-165	volts
Peak Cathode Current	1,7	3.2	-	amp
Useful Power Output.	1,8	225	-	watts

Note 1: With 6.3 volts ac on heater.

Note 2: With dc grid voltage of -15 volts, and dc plate voltage adjusted to give dc plate current of 250 ma.

Note 3: With external shield, as described under (♦) connected to grid terminal.

Note 4: With dc grid voltage of -10 volts, and dc plate voltage adjusted to give dc plate current of 250 ma.

Note 5: With dc grid voltage of -20 volts, and dc plate voltage adjusted to give dc plate current of 250 ma.

Note 6: With dc plate voltage of 1600 volts, and dc grid voltage adjusted to give dc plate current of 1.0 ma.

Note 7: Designers should limit the maximum useable cathode current (plate current and grid current) to this value under any condition of operation.

Note 8: In a self-excited oscillator circuit and with dc plate voltage of 1600 volts, dc plate current of 250 ma., dc grid current of 50 to 75 ma., grid resistor of 2000 ±10% ohms, and frequency of 15 Mc.

MAXIMUM RATINGS vs OPERATING FREQUENCY

Frequency	900	1200	1400	1650	2000	Mc
MAX. PERMISSIBLE PERCENTAGE OF MAX. RATED PLATE VOLTAGE AND PLATE INPUT:						
Class B Television	100	80	71	62.5	62.5	%
Class C Television, Grid-Modulated	100	80	71	62.5	62.5	%
Class C Telephony, Plate-Modulated	100	80	71	62.5	62.5	%
Class C Telegraphy	100	80	71	62.5	62.5	%
Class C FM Telephony	100	80	71	62.5	62.5	%

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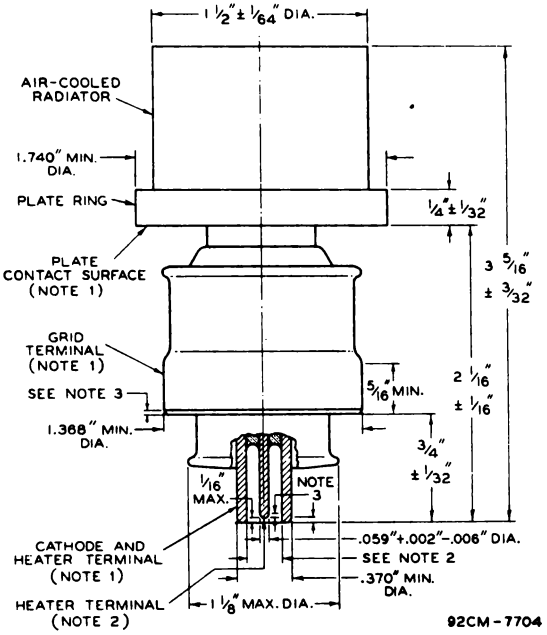

NOTE 1: WITH THE CYLINDRICAL SURFACES OF ITS GRID AND CATHODE TERMINALS CLEAN, SMOOTH, AND FREE OF BURRS, THE TUBE WILL ENTER A GAUGE AS SHOWN IN SKETCH G_1. THE FOUR CYLINDRICAL HOLES H_1, H_2, H_3, AND H_4 HAVE AXES CO-INCIDENT WITHIN 0.0005", LENGTHS DETERMINED FROM THE OUT-LINE DRAWING, AND SUCCESSIVELY SMALLER DIAMETERS AS SHOWN IN THE SKETCH.

THE PLATE RING WILL BE ENTIRELY ENGAGED BY HOLE H_1, AND THE CONTACT SURFACE OF THE PLATE RING WILL SEAT ON THE SHOULDER BETWEEN HOLES H_1 AND H_2. THE PLANE SURFACE OF THIS SHOULDER IS $90^\circ \pm 2'$ TO THE AXES OF THE HOLES. SEATING IS DETERMINED BY FAILURE OF A 0.005" THICKNESS GAUGE, 1/8" WIDE, TO ENTER MORE THAN 1/16" BETWEEN THE SHOULDER SURFACE AND THE PLATE CONTACT SURFACE.

WITH THE TUBE PROPERLY SEATED AS DESCRIBED ABOVE, THE GRID TERMINAL WILL BE ENTIRELY ENGAGED BY HOLE H_3, AND THE CATHODE TERMINAL WILL BE ENGAGED BY HOLE H_4 TO A DEPTH OF AT LEAST 1/4".

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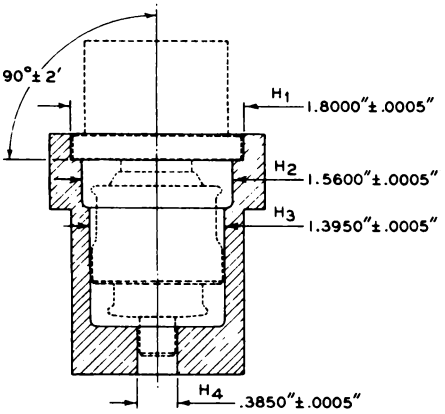
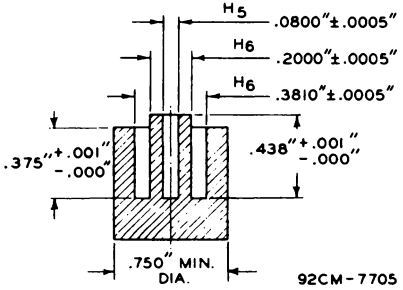
NOTE 2: CONCENTRICITY OF THE HEATER TERMINAL WITH RESPECT TO THE CATHODE TERMINAL IS DETERMINED BY A GAUGE AS SHOWN IN SKETCH G2. THE CYLINDRICAL HOLE H_5 AND THE ANNULAR HOLE H_6 HAVE AXES COINCIDENT WITHIN 0.0005". THE CATHODE TERMINAL AND THE HEATER TERMINAL WILL ENTER THIS GAUGE TO A DEPTH OF 3/8".

NOTE 3: MAY BE ROUNDED OR BEVELED NOT TO EXCEED 1/16".

Sketch G_1



Sketch G_2



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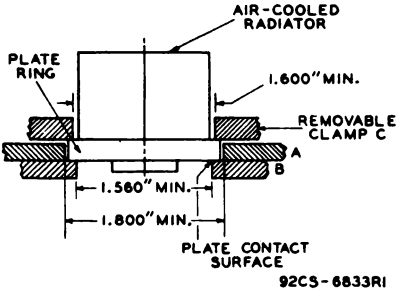
UHF POWER TRIODE

Mounting Arrangement for Use with Coaxial-Line or Cavity Circuits.



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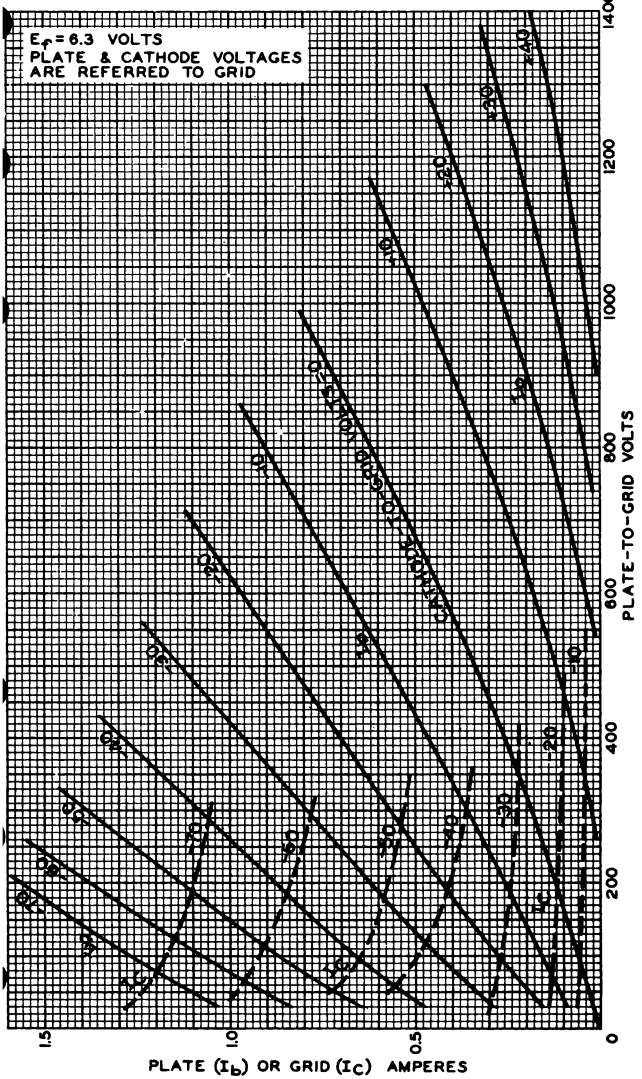
AVERAGE CHARACTERISTICS



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VHF POWER TETRODE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:

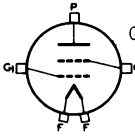
Voltage*	5.0 ± 5%	ac or dc volts
Current at 5 volts	175	amp
Minimum Heating Time	15	seconds
Cold Resistance	0.0038	ohm
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 2000, grid-No.2 volts = 1000, and plate amp. = 2	10	
Direct Interelectrode Capacitances:		
Grid No.1 to Plate**	0.6 max.	μμf
Grid No.1 to Filament	44	μμf
Plate to Filament**	0.08 max.	μμf
Grid No.1 to Grid No.2	60	μμf
Grid No.2 to Plate	23	μμf

Mechanical:

Terminal Connections:

F - Filament Post

G_1 - Grid-No.1 Term. (Adjacent to Fil. Posts)



G_2 - Grid-No.2 Terminal (Between Grid-No.1 & Grid-No.2 Term.)

P - Plate Terminal (Ring of Radiator)

Mounting Position	Vertical, filament end up or down
Maximum Overall Length	11-5/8"
Maximum Diameter	6-13/32"
Radiator	Integral part of tube

Air Flow:

Through Radiator--The specified flow of incoming air at a temperature of 45°C for various plate dissipations, indicated in the tabulation below, should be delivered by a blower through the radiator before and during the application of any voltages. The air should enter the radiator at its plate-contact-surface end (see *Outline Drawing*). Filament power, plate power, and air flow may be removed simultaneously.

Percentage of Max. Rated Plate Dissipation for Each Class of Service	100	80	60	per cent
Minimum Air Flow	350	270	200	cfm
Static Pressure	3	2.1	1.3	in. of water

* Full rated filament voltage can be applied safely to the cold filament. It is not necessary to provide means for limiting the filament starting current.

** With external flat metal shield 12" square having center hole 4-5/16" diameter. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid No.2.

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VHF POWER TETRODE

To Grid-No.2 Terminal:		
Plate-Ring End	§§	
Grid-No.1-Terminal End	50 min.	cfm

§§ A sufficient quantity of the air flow to the radiator should be directed onto the plate end of the grid-No.2 terminal so that its temperature does not exceed the specified value.

To Grid-No.1 Terminal and Filament Seals	50 min.	cfm
Incoming-Air Temperature	45 max.	°C
Radiator Temperature (Measured on the core at end away from incoming air) . . .	180 max.	°C
Glass Temperature (At hottest part)	180 max.	°C
Seal Temperature:		
Filament, Grid No.1, Grid No.2, and Plate	180 max.	°C
Weight (Approx.)	15	pounds

Fittings:

Filament Connector (2 required).	RCA-216F1
Connector Wrench (2 required)	RCA-212F1

RF POWER AMPLIFIER--Class B Television Service

Synchronizing-level conditions per tube unless otherwise specified
(Voltages are referred to cathode unless otherwise specified)

Maximum CCS● Ratings, *Absolute Values:*

	54 to 216 Mc	
DC PLATE VOLTAGE	6000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	2000 max.	volts
DC PLATE CURRENT	4 max.	amp
PLATE INPUT	22000 max.	watts
GRID-No.2 INPUT	400 max.	watts
PLATE DISSIPATION	10000 max.	watts
GRID-No.1 (CONTROL-GRID) DISSIPATION . . .	300 max.	watts

Typical Operation in Grid-Drive Circuit:

	Bandwidth▲ of 8.5 Mc	
DC Plate Voltage	5800	volts
DC Grid-No.2 Voltage	1200	volts
DC Grid-No.1 Voltage	-130	volts
Peak RF Grid-No.1 Voltage:		
Synchronizing Level	375	volts
Pedestal Level	290	volts
DC Plate Current:		
Synchronizing Level	3.45	amp
Pedestal Level	2.60	amp

●,▲: See next page.

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VHF POWER TETRODE

DC Grid-No.2 Current (Pedestal Level) .	0.207	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing Level	0.350	amp
Pedestal Level	0.170	amp
Driver Power Output (Approx.):♦		
Synchronizing Level	800#	watts
Pedestal Level	450	watts
Power Output (Approx.):		
Synchronizing Level	12000	watts
Pedestal Level	6800	watts

Typical Operation in Cathode-Drive Circuit:

	Bandwidth▲ of 8.5 Mc	
DC Plate-to-Grid-No.1 Voltage	5885	volts
DC Grid-No.2 Voltage.	885	volts
DC Cathode-to-Grid-No.1 Voltage	85	volts
Peak RF Cathode-to-Grid-No.1 Voltage:		
Synchronizing Level	330	volts
Pedestal Level	260	volts
DC Plate Current:		
Synchronizing Level	3.45	amp
Pedestal Level	2.60	amp
DC Grid-No.2 Current (Pedestal Level) .	0.152	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing Level	0.405	amp
Pedestal Level	0.220	amp
Driver Power Output (Approx.):♦		
Synchronizing Level	1300##	watts
Pedestal Level	700	watts
Power Output (Approx.):		
Synchronizing Level	12000	watts
Pedestal Level	6800	watts

BIAS-MODULATED RF POWER AMPLIFIER--Class C Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS● Ratings, *Absolute Values:*

	54 to 216 Mc	
DC PLATE VOLTAGE.	6000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	2000 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE (White Level) . . .	-1000 max.	volts

♦ The driver stage is required to supply tube losses, rf circuit losses, and rf power added to plate circuit. The driver stage should be designed as indicated under (♦).

This value includes 300 watts of rf circuit loss at 216 Mc, and 900 watts added to plate circuit.

●,▲,♦,#: See next page.

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VHF POWER TETRODE

DC PLATE CURRENT	4 max.	amp
PLATE INPUT	22000 max.	watts
GRID-No.2 INPUT	400 max.	watts
PLATE DISSIPATION	10000 max.	watts
GRID-No.1 DISSIPATION	300 max.	watts

Typical Operation in Grid-Drive Circuit:

Bandwidth▲ of 8.5 Mc

DC Plate Voltage	5800	volts
DC Grid-No.2 Voltage	1200	volts
DC Grid-No.1 Voltage:		
Synchronizing Level	-130	volts
Pedestal Level	-195	volts
White Level	-350	volts
Peak RF Grid-No.1 Voltage	375	volts
DC Plate Current:		
Synchronizing Level	3.45	amp
Pedestal Level	2.42	amp
DC Grid-No.2 Current (Pedestal Level)	0.148	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing Level	0.350	amp
Pedestal Level	0.190	amp
Driver Power Output (Approx.):♦		
Synchronizing Level	800#	watts
Power Output (Approx.):		
Synchronizing Level	12000	watts
Pedestal Level	6800	watts

PLATE-MODULATED RF POWER AMP.--Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values*:†

DC PLATE VOLTAGE	5000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	2000 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-1000 max.	volts
DC PLATE CURRENT	2 max.	amp
DC GRID-No.1 CURRENT	0.6 max.	amp
PLATE INPUT	10000 max.	watts
GRID-No.2 INPUT	270 max.	watts
PLATE DISSIPATION	6600 max.	watts

Typical Operation in Grid-Drive Circuit:

Up to 30 Mc

DC Plate Voltage	4700	volts
DC Grid-No.2 Voltage (Modulated 100%)♦	800	volts

▲ Computed between half-power points and based on tube output capacitance only.

This value includes 700 watts of rf circuit loss at 216 Mc.

♦ Obtained preferably from a separate source.

●,♦,†: See next page.

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VHF POWER TETRODE

DC Grid-No.1 Voltage*	-280	volts
Peak RF Grid-No.1 Voltage	485	volts
DC Plate Current	1.56	amp
DC Grid-No.2 Current	0.217	amp
DC Grid-No.1 Current (Approx.)	0.300	amp
Driver Power Output (Approx.)	180●	watts
Power Output (Approx.)	5500	watts

RF POWER AMPLIFIER & OSC.--Class C Telegraphy□ and RF POWER AMPLIFIER--Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*†

DC PLATE VOLTAGE	6600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	2000 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-1000 max.	volts
DC PLATE CURRENT	2.75 max.	amp
DC GRID-No.1 CURRENT	0.6 max.	amp
PLATE INPUT	18000 max.	watts
GRID-No.2 INPUT	400 max.	watts
PLATE DISSIPATION	10000 max.	watts

Typical Operation in Grid-Drive Circuit:

	At 216 Mc		
DC PLATE VOLTAGE	5800	5800	volts
DC Grid-No.2 Voltage●●	1200	1200	volts
DC Grid-No.1 Voltage▲▲	-130	-175	volts
Peak RF Grid-No.1 Voltage	230	370	volts
DC Plate Current	1.8	2.6	amp
DC Grid-No.2 Current	0.1	0.267	amp
DC Grid-No.1 Current (Approx.)	0.1	0.222	amp
Driver Power Output (Approx.)♦	300■	750●	watts
Power Output (Approx.)	6000	9000	watts

♦ The driver stage is required to supply tube losses and rf circuit losses. The driver stage should be designed to provide an excess of power above the indicated value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

† These ratings hold for operation up to 30 Mc; for ratings at higher frequencies, see Maximum Ratings vs Frequency Table.

* Obtained preferably from a combination of 365-ohm grid-No.1 resistor and -170-volt fixed bias.

● This value includes 50 watts of rf circuit loss at 30 Mc.

□ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

▲▲ Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

● Continuous Commercial Service.

■,●,●●: See next page.

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VHF POWER TETRODE

■ This value includes 270 watts of rf circuit loss.

● This value includes 675 watts of rf circuit loss.

●● Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should not be used if the 6166 or a preceding stage is keyed. In this case, the regulation of the source should be sufficient to prevent the grid-No.2 voltage from rising above 2000 volts under key-up conditions; and additional fixed grid-No.1 bias must be provided to limit the plate current.

MAXIMUM RATINGS vs OPERATION FREQUENCY

FREQUENCY	30	220	Mc
MAX. PERMISSIBLE PERCENTAGE OF MAX. RATING PLATE VOLTAGE AND PLATE INPUT:			
Class B Television Service	Full Ratings—54 to 216 Mc		
Class C Television Service	Full Ratings—54 to 216 Mc		
Class C Telephony, Plate-Modulated	100	90	%
Class C Telegraphy and FM Telephony	100	90	%

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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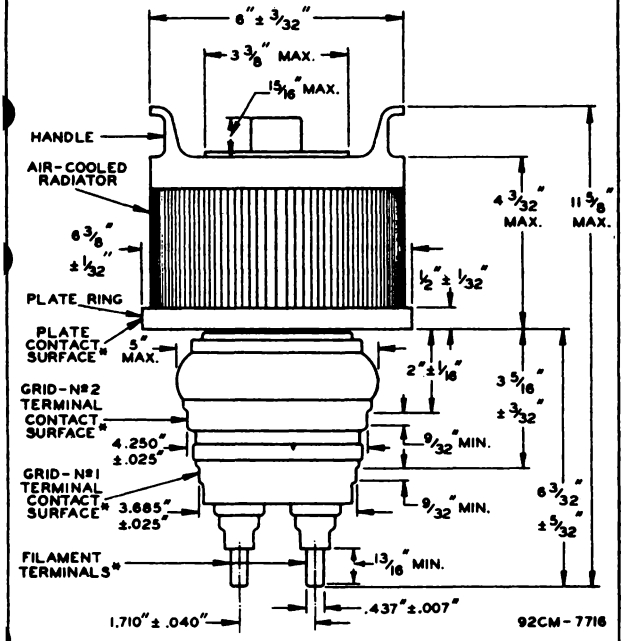
VHF POWER TETRODE



* WITH THE CYLINDRICAL SURFACES OF THE PLATE RING, GRID-No.2 TERMINAL, GRID-No.1 TERMINAL, AND FILAMENT TERMINALS CLEAN, SMOOTH, AND FREE OF BURRS, THE TUBE WILL ENTER A GAUGE AS SHOWN IN SKETCH G_1 *(on next page)*. PROPER ENTRY OF THE TUBE IN THE GAUGE IS OBTAINED WHEN THE PLATE RING IS ENTIRELY ENGAGED BY HOLE H_1.

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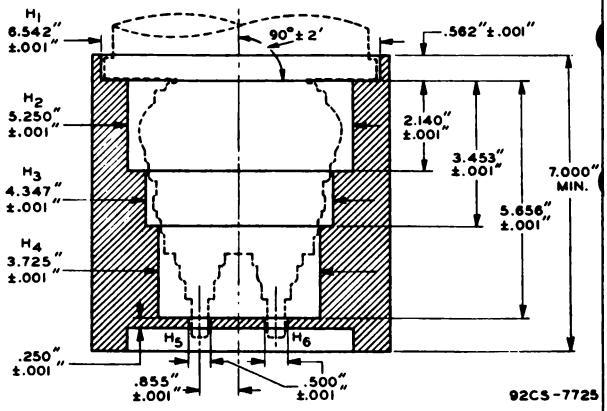
VHF POWER TETRODE

SKETCH G_1



THE FOUR CYLINDRICAL HOLES H_1, H_2, H_3, AND H_4 HAVE AXES COINCIDENT WITHIN 0.001". THE HOLES H_5 AND H_6 HAVE AXES PARALLEL TO THE AXES OF H_1, H_2, H_3, AND H_4 WITHIN $0^\circ \pm 2'$.

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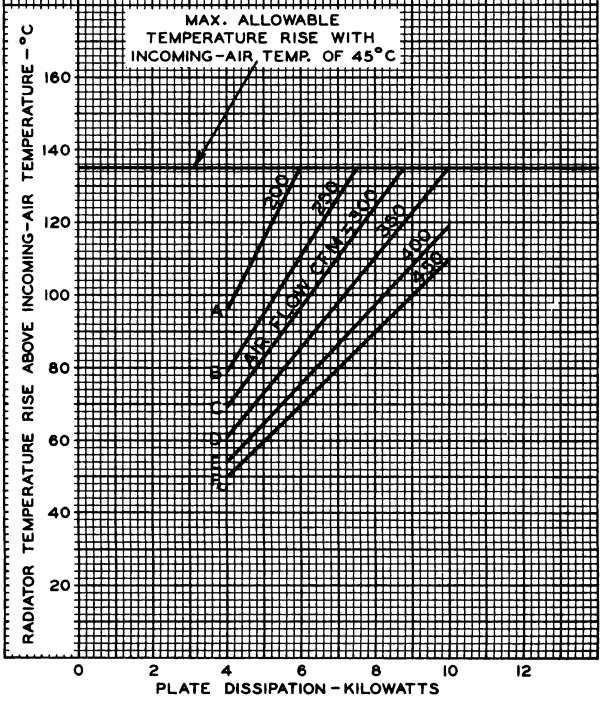
COOLING REQUIREMENTS

E_f = 5.0 VOLTS AC MAXIMUM RADIATOR TEMPERATURE = 180°C

CURVE	PRESSURE DROP INCHES OF WATER
A	1.3
B	1.8
C	2.4
D	3.0
E	3.7
F	4.5

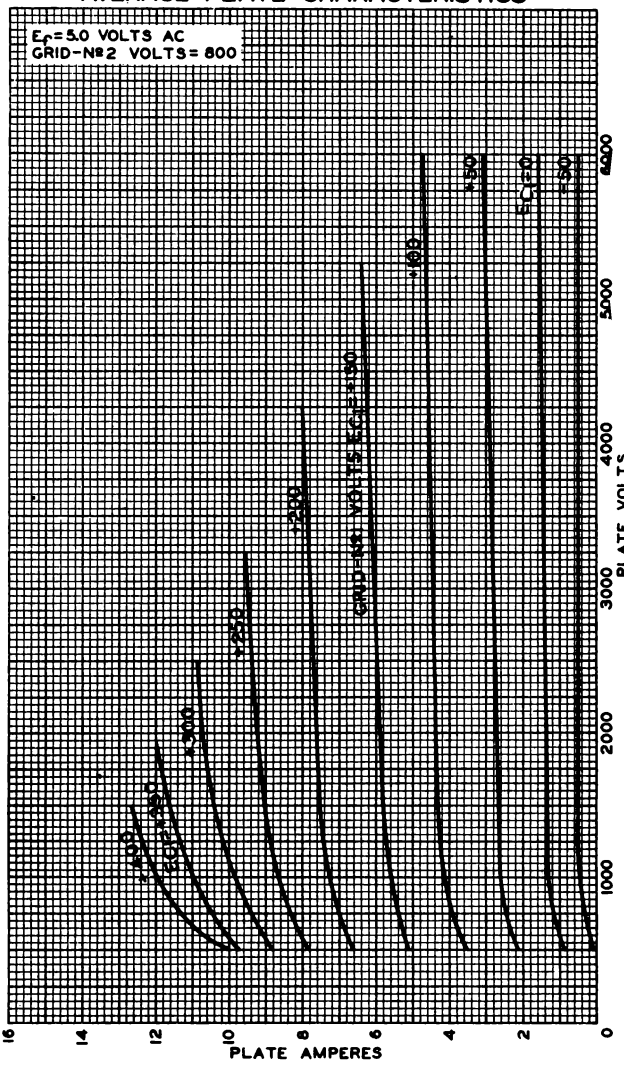
CURVES TAKEN ACCORDING TO NAFM* STANDARDS — BULLETIN № 103

*NATIONAL ASSOCIATION OF FAN MFGS., GENERAL MOTORS BLDG., DETROIT, MICH.



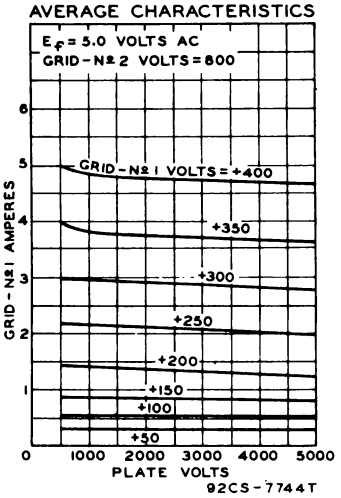
6166

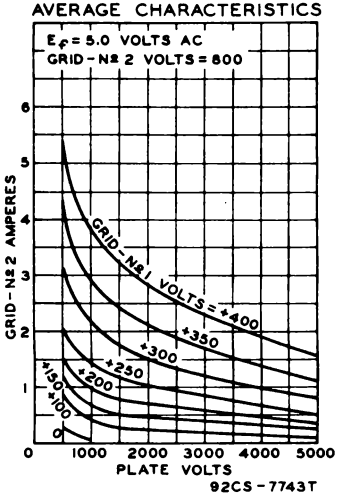
AVERAGE PLATE CHARACTERISTICS



6166

VHF POWER TETRODE





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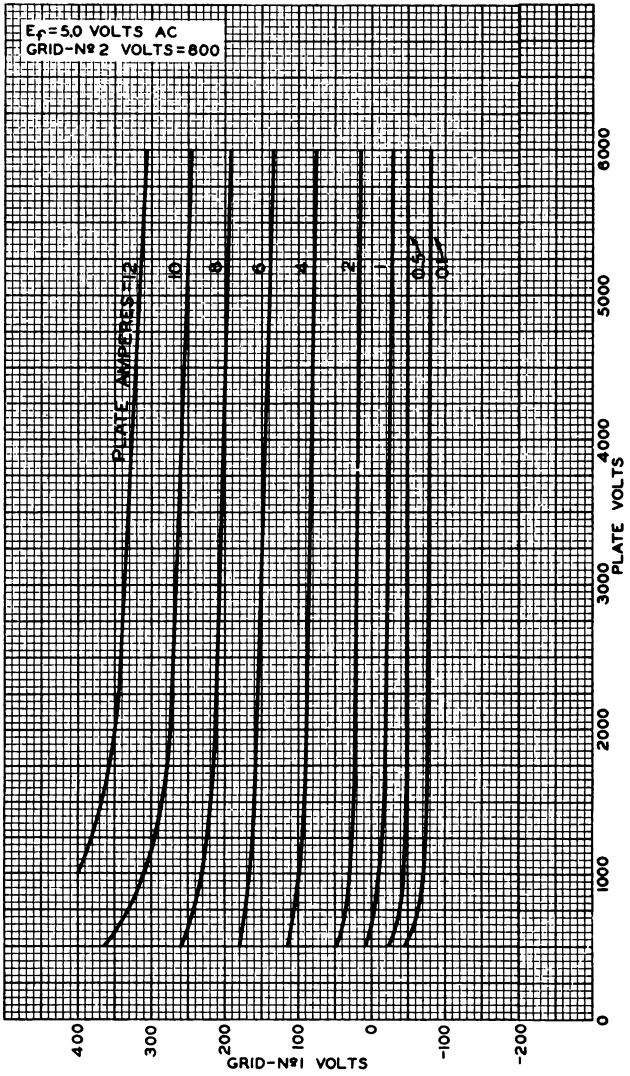
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



JAN. 22, 1952

TUBE DEPARTMENT

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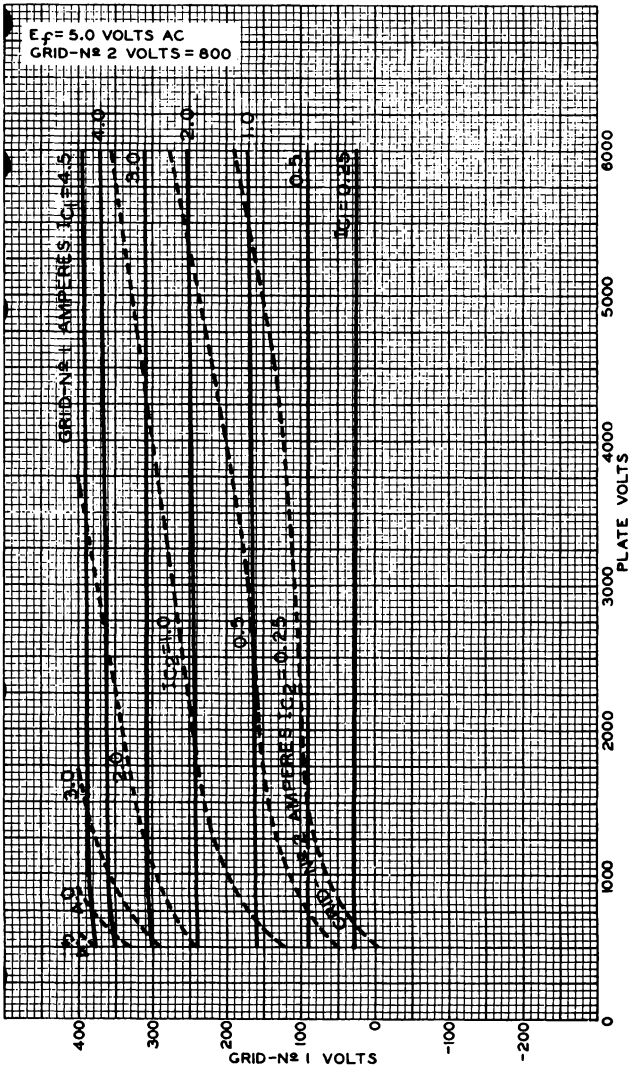
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



JAN. 22, 1952

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7738

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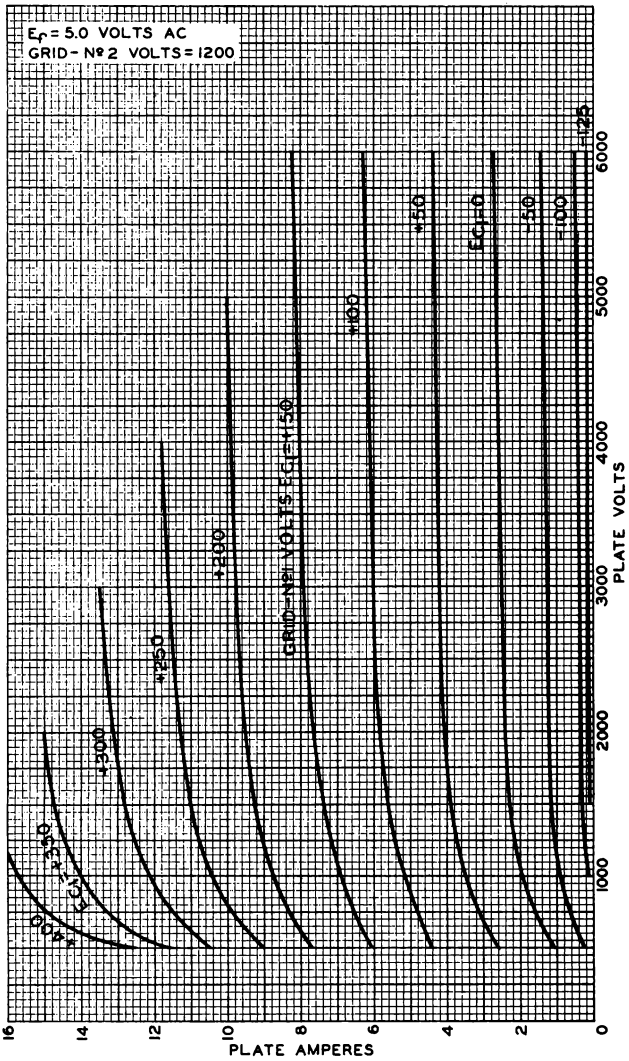
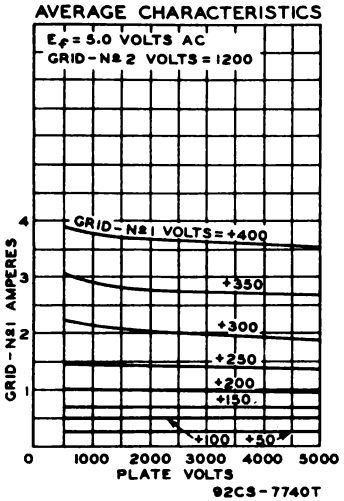
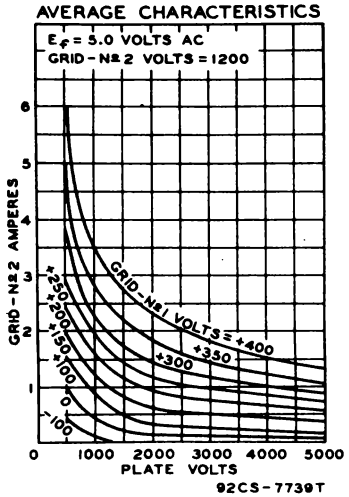
AVERAGE PLATE CHARACTERISTICS



6166

VHF POWER TETRODE





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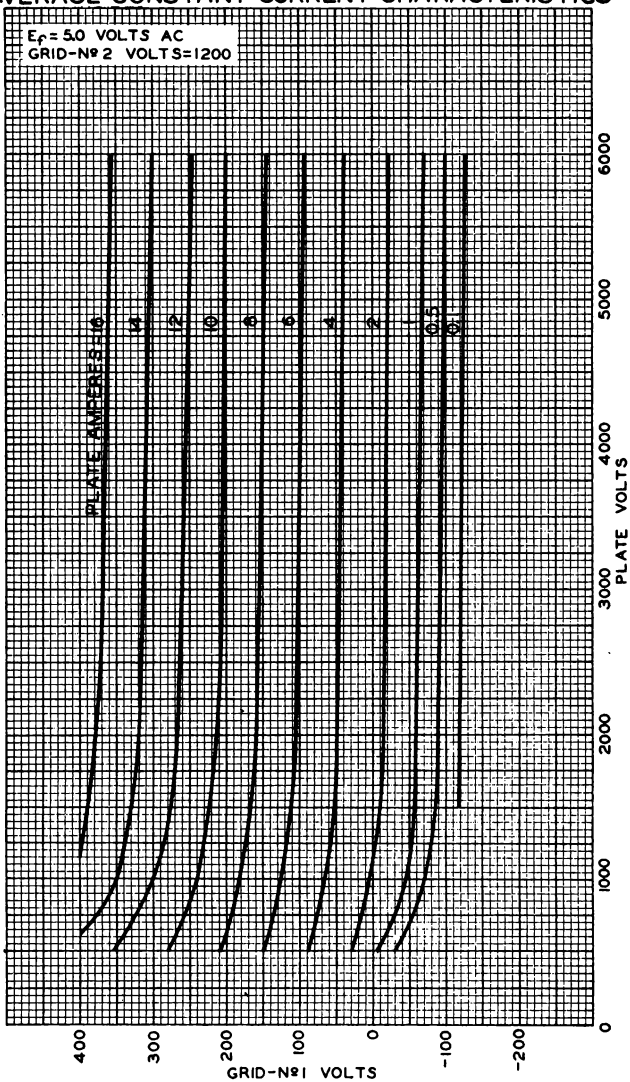
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



JAN. 15,1952

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92CM-7733

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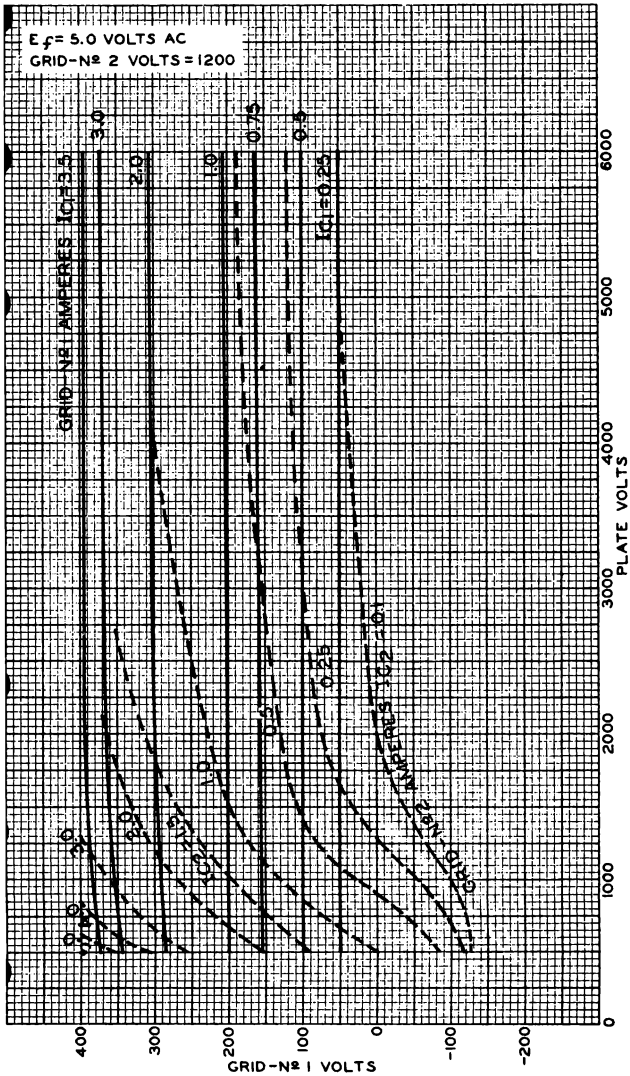
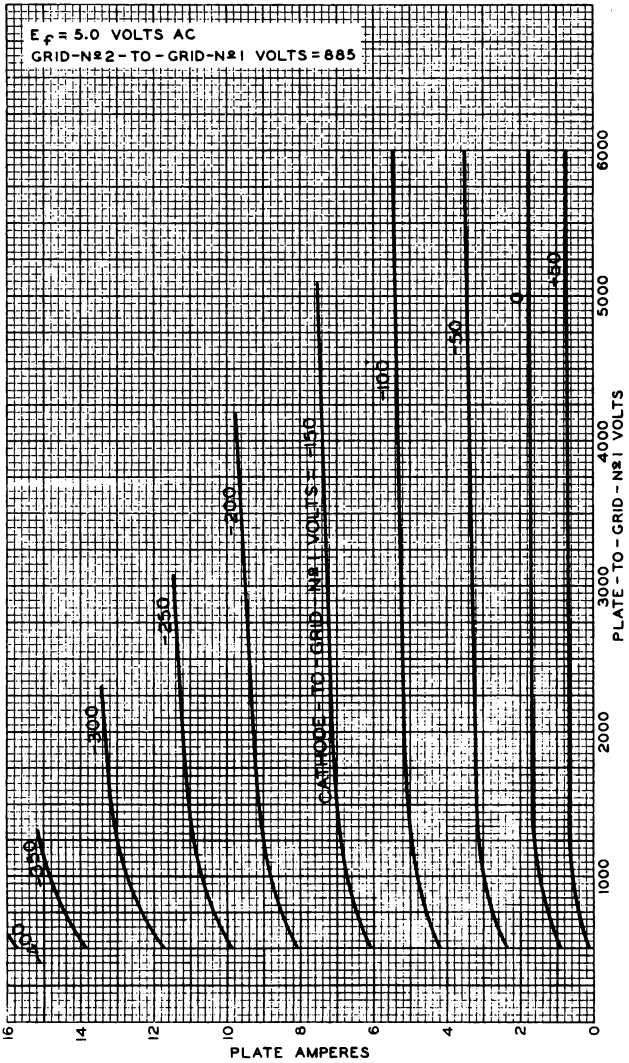
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



6166

6166
AVERAGE PLATE CHARACTERISTICS
FOR CATHODE-DRIVE OPERATION



FEB. 7, 1951 TUBE DEPARTMENT 92CM-7750

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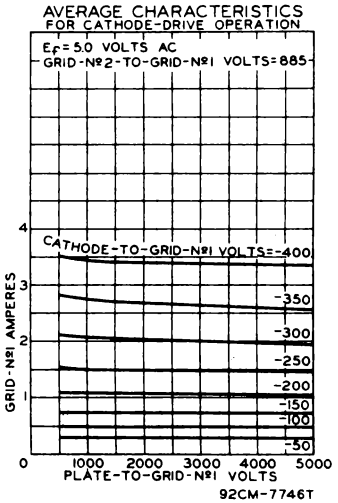
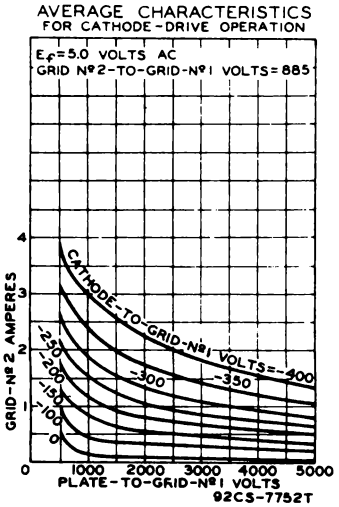
6166

VHF POWER TETRODE





6166

RCA

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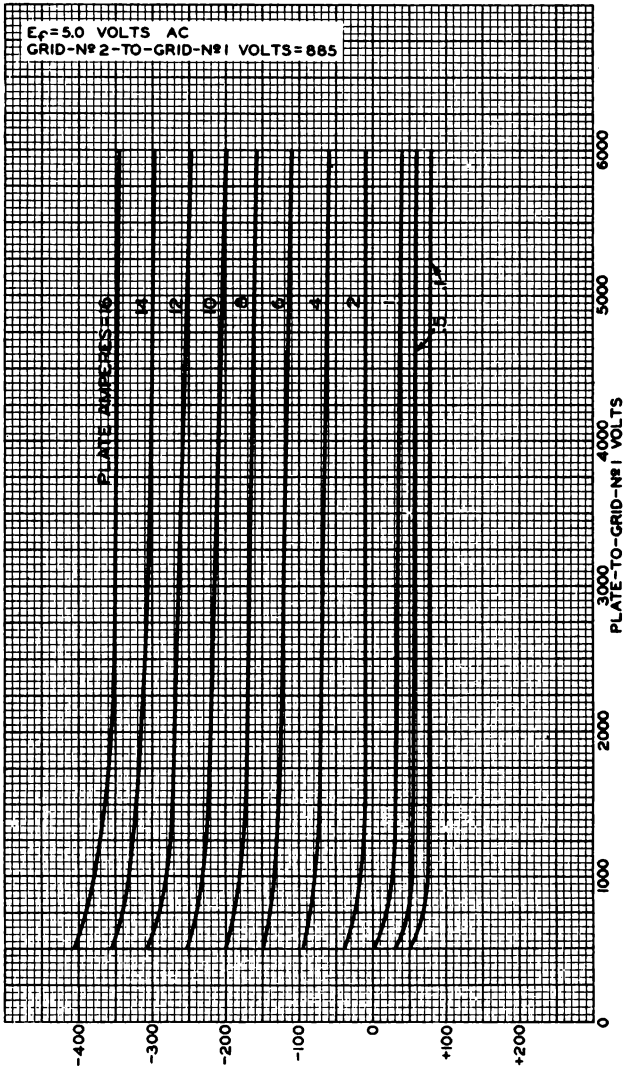
AVERAGE CONSTANT-CURRENT CHARACTERISTICS
FOR CATHODE-DRIVE OPERATION



FEB. 7, 1952

TUBE DEPARTMENT

92CM-7749

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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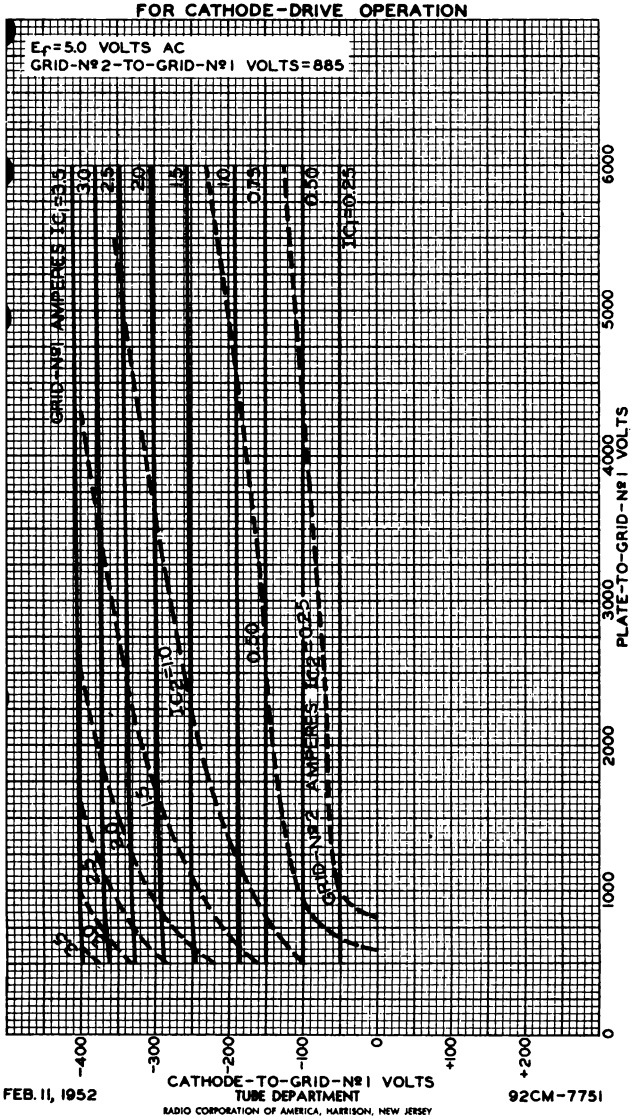
AVERAGE CONSTANT-CURRENT CHARACTERISTICS
FOR CATHODE-DRIVE OPERATION



FEB. 11, 1952

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7751

6181

UHF POWER TETRODE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

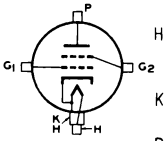
Heater, for Unipotential Cathode:		
Voltage*	120 av.	. . . . ac or dc volts
	130 max.	. . . . ac or dc volts
Current at 120 volts . .	1.6	. . . . . amp ←
Minimum Heating Time . .	10♦	. . . . . minutes ←
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 1000, grid-No.2 volts = 400, and plate amperes = 1 .	8	
Direct Interelectrode Capacitances:		←
Grid No.1 to Plate** . .	0.40 max.	. . . . . μμf
Grid-No.1 to Cathode . .	44	. . . . . μμf
Plate to Cathode** . . .	0.11 max.	. . . . . μμf
Grid No.1 to Grid No.2 .	50	. . . . . μμf
Grid No.2 to Plate . . .	22	. . . . . μμf
Grid No.2 to Cathode***.	4.2 max.	. . . . . μμf

Mechanical:

Terminal Connections:

G_1 - Grid-No.1 Term. (Adjacent to Cath. & Heat. Term.)

G_2 - Grid-No.2 Term. (Adjacent to Plate Flange)



H - Heater Terminals (Center Pin at Cath. End & Cath. Term.)

K - Cathode Terminal (End Opposite Rad'r)

P - Plate-Term. Flange

Mounting Position	Vertical, cathode end up or down
Maximum Overall Length	7-7/16"
Greatest Diameter	5" ± 1/32"
Radiator	Integral part of tube

Air Flow:

Through Radiator--The specified flow of incoming air for various plate dissipations, as indicated in the tabulation below, should be delivered by a blower through the radiator in either direction before and during the application of any voltages. The flow and pressure values are for condition with radiator-temperature rise held constant at 135°C above incoming-air temperature. Under any condition, the air flow must be adequate to limit the temperature of the radiator to its specified maximum value. Heater power, plate power, and air flow may be removed simultaneously.

* Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

** With external flat metal shield 8" in diameter and having center hole 3-13/32" in diameter. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid-No.2 terminal.

*** Same as (**) except that center hole has diameter of 2-31/32", and shield is connected to grid-No.1 terminal. ←

♦ It is essential that the 6181 be allowed to warm up for the indicated minimum time after normal heater voltage of 120 volts has been applied and before other voltages are applied in order to prevent premature failures that might result from incomplete temperature stabilization of the tube elements. ←

←Indicates a change

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UHF POWER TETRODE

Percentage of Max. Rated Plate Dissipation for Each Class of Service .	100	75	50	per cent
Minimum Air Flow	75	50	30	cfm
Static Pressure	0.56	0.25	0.10	in. of water

To Grid-No.2 Terminal—A sufficient quantity of air should be delivered to this terminal so that its temperature does not exceed the specified maximum value.

To Grid-No.1 Terminal
Cathode Terminal, and
Heater Pin—An air flow of about 20 cfm from a 1" diameter nozzle at a distance of 1/2" from the heater pin should be directed onto the cathode terminal and heater pin, and then over the grid-No.1 terminal. The quantity of air should be sufficient so that the temperature of the cathode, heater, and grid-No.1 seals does not exceed the specified maximum value.

Radiator Temperature (Measured on the core at end adjacent to plate-terminal flange).	180 max.	°C
Seal and Terminal Temperature: Cathode, Heater, Grid No.1, Grid No.2, and Plate	180 max.	°C

RF POWER AMPLIFIER--Class B Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	2000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	500 max.	volts
DC PLATE CURRENT	1.75 max.	amp
DC GRID-No.1 (CONTROL-GRID) CURRENT . . .	0.2 max.	amp
PLATE INPUT	3500 max.	watts
GRID-No.2 INPUT	40 max.	watts
PLATE DISSIPATION	2000 max.	watts

Typical Operation in Cathode-Drive Circuit at 900 Mc:

Bandwidth▲ of 8 Mc

Air Flow Through Radiator:		
Minimum with Incoming Air at 45°C . . .	60	cfm
Static Pressure	0.36	in. of water
DC Plate-to-Grid-No.1 Voltage	1875	volts
DC Grid-No.2-to-Grid-No.1 Voltage	550	volts
DC Cathode-to-Grid-No.1 Voltage	75	volts
Peak RF Cathode-to-Grid-No.1 Voltage:		
Synchronizing Level	120	volts
Pedestal Level	90	volts

●,▲: See next page.

TUBE DIVISION
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UHF POWER TETRODE

DC Plate Current:		
Synchronizing Level	1.7	amp
Pedestal Level	1.3	amp
DC Grid-No.2 Current (Pedestal Level) . .	-0.025	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing Level	0.075	amp
Pedestal Level	0.020	amp
Driver Power Output (Approx.):♣		
Synchronizing Level	200	watts
Pedestal Level	115	watts
Output-Circuit Efficiency (Approx.) . . .	75	per cent
Useful Power Output (Approx.):		
Synchronizing Level	1200●●	watts
Pedestal Level	675●●	watts

BIAS-MODULATED RF POWER AMPLIFIER--Class C Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	2000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	500 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE (White Level)	-300 max.	volts
DC PLATE CURRENT	1.75 max.	amp
DC GRID-No.1 CURRENT	0.2 max.	amp
PLATE INPUT	3500 max.	watts
GRID-No.2 INPUT	40 max.	watts
PLATE DISSIPATION	2000 max.	watts

Typical Grid-Bias-Modulated Operation in Cathode-Drive Circuit at 900 Mc:

Bandwidth of 8 Mc

Air Flow Through Radiator:		
Minimum, with Incoming Air at 45°C . .	*60*	*cfm*
Static Pressure	*0.36*	*in. of water*
DC Plate-to-Grid-No.1 Voltage	1875	volts
DC Grid-No.2-to-Grid-No.1 Voltage	550	volts
DC Cathode-to-Grid-No.1 Voltage:		
Synchronizing Level	75	volts
Pedestal Level	105	volts
White Level	230	volts
Peak RF Cathode-to-Grid-No.1 Voltage . .	120	volts
DC Plate Current:		
Synchronizing Level	1.7	amp
Pedestal Level	1.2	amp
DC Grid-No.2 Current (Pedestal Level) . .	-0.025	amp

●,▲,♣,●●: See next page.

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DC Grid-No.1 Current (Approx.):		
Synchronizing Level	0.075	amp
Pedestal Level.	0.020	amp
Driver Power Output (Approx.):♣		
Synchronizing Level	200	watts
Output-Circuit Efficiency (Approx.) . . .	75	per cent
Useful Power Output (Approx.):		
Synchronizing Level	1200●●	watts
Pedestal Level.	675●●	watts

Typical Cathode-Bias-Modulated Operation

In Cathode-Drive Circuit at 900 Mc:

	Bandwidth▲ of 8 Mc	
Air Flow Through Radiator:		
Minimum, with Incoming Air at 45°C . .	*60*	*cfm*
Static Pressure	*0.36*	*in. of water*
DC Plate-to-Grid-No.1 Voltage	1875	volts
DC Grid-No.2-to-Grid-No.1 Voltage	550	volts
DC Cathode-to-Grid-No.1 Voltage:		
Synchronizing Level	75	volts
Pedestal Level	105	volts
White Level	210	volts
Peak RF Cathode-to-Grid No.1 Voltage . .	120	volts
DC Plate Current:		
Synchronizing Level	1.7	amp
Pedestal Level	1.2	amp
DC Grid-No.2 Current (Pedestal Level) . .	-0.025	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing Level	0.075	amp
Pedestal Level	0.020	amp
Driver Power Output (Approx.):♣		
Synchronizing Level	200	watts
Output-Circuit Efficiency (Approx.) . . .	75	per cent
Useful Power Output (Approx.):		
Synchronizing Level	1200●●	watts
Pedestal Level	675●●	watts

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	1600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .	-300 max.	volts
DC PLATE CURRENT	1.05 max.	amp
DC GRID-No.1 CURRENT	0.2 max.	amp

▲ Measured between half-power points.

●,♣,●●: See next page.

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UHF POWER TETRODE

PLATE INPUT	1650 max.	watts
GRID-No.2 INPUT	25 max.	watts
PLATE DISSIPATION	1300 max.	watts

Typical Operation in Cathode-Drive Circuit at 400 Mc:

Air Flow Through Radiator:		
Minimum with Incoming Air at 45°C	*40*	*cfm*
Static Pressure	*0.16*	*in. of water*
DC Plate-to-Grid-No.1 Voltage	1775	volts
DC Grid-No.2-to-Grid-No.1 Voltage	550	volts
DC Cathode-to-Grid-No.1 Voltage	175	volts
Peak RF Cathode-to-Grid-No.1 Voltage	210	volts
DC Plate Current	1.00	amp
DC Grid-No.2 Current	0.065	amp
DC Grid-No.1 Current (Approx.)	0.045	amp
Driver Power Output (Approx.)♣#	250	watts
Output-Circuit Efficiency (Approx.)	90	per cent
Useful Power Output (Approx.)	950●●	watts

RF POWER AMPLIFIER & OSC.--Class C Telegraphy□
and
RF POWER AMPLIFIER--Class C FM Telephony

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	2000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	500 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-300 max.	volts
DC PLATE CURRENT	1.25 max.	amp
DC GRID-No.1 CURRENT	0.2 max.	amp
PLATE INPUT	2500 max.	watts
GRID-No.2 INPUT	40 max.	watts
PLATE DISSIPATION	2000 max.	watts

Typical Operation in FM Service with Cathode-Drive Circuit at 900 Mc:

Air Flow Through Radiator:		
Minimum, with Incoming Air at 45°C	*30*	*cfm*
Static Pressure	*0.09*	*in. of water*
DC Plate-to-Grid-No.1 Voltage	1910	volts
DC Grid-No.2-to-Grid-No.1 Voltage†	550	volts
DC Cathode-to-Grid-No.1 Voltage††	110	volts

● Continuous Commercial Service.

In cathode-drive, plate-modulated, class C rf power amplifier service, the 6181 can be modulated 100% if the rf driver stage is also modulated 100% simultaneously. Care should be taken to insure that the driver-modulation and amplifier-modulation voltages are exactly in phase.

□ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

♣,●●,†,††: See next page.

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6181

UHF POWER TETRODE

Peak RF Cathode-to-Grid-No.1 Voltage . . .	120	volts
DC Plate Current	0.9	amp
DC Grid-No.2 Current	0.05	amp
DC Grid-No.1 Current (Approx.)	0.015	amp
Driver Power Output (Approx.)♣	150	watts
Output-Circuit Efficiency (Approx.) . . .	70	per cent
Useful Power Output (Approx.)	600●●	watts

♣ The driver stage is required to supply tube losses, rf circuit losses, and rf power added to the plate input. The driver stage should be designed to provide an excess of power above the indicated value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

●● This value of useful power is measured at load of output circuit having indicated efficiency.

† Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should not be used if the 6181 or a preceding stage is keyed. In this case, the regulation of the source should be sufficient to prevent the grid-No.2 voltage from rising above 500 volts under key-up conditions; and additional fixed grid-No.1 bias must be provided to limit the plate current.

†† Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

The 6181 can be operated with full plate voltage and plate input at frequencies as high as 900 Mc.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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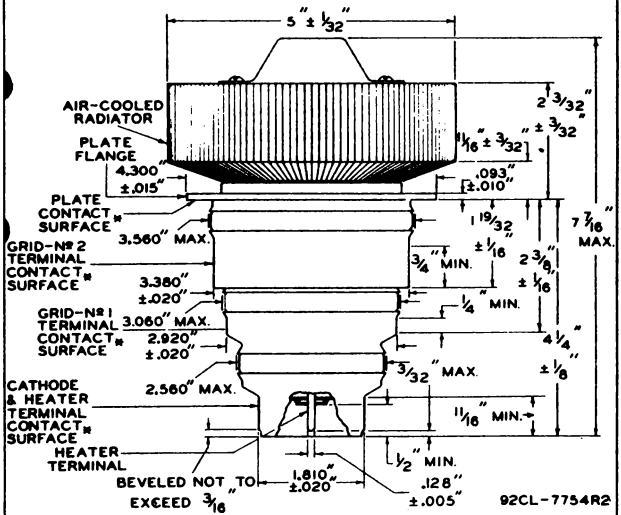
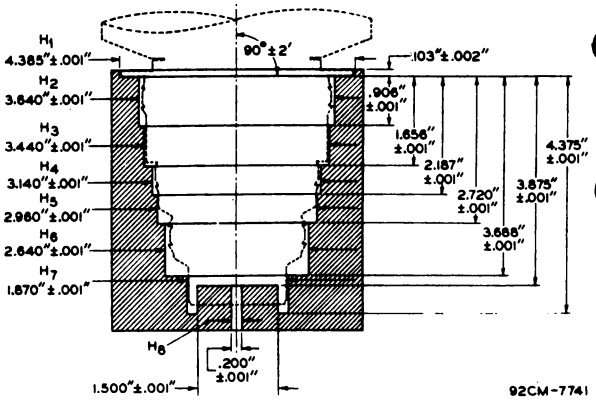
UHF POWER TETRODE



*WITH THE CYLINDRICAL SURFACES OF THE PLATE FLANGE, GRID-No.2 TERMINAL, GRID-No.1 TERMINAL, CATHODE TERMINAL, AND HEATER-PIN TERMINAL CLEAN, SMOOTH, AND FREE OF BURRS, THE TUBE WILL ENTER A GAUGE AS SHOWN IN SKETCH G_1 *(on next page)*. PROPER ENTRY OF THE TUBE IN THE GAUGE IS OBTAINED WHEN THE PLATE FLANGE IS SEATED ON THE SHOULDER BETWEEN HOLES H_1 AND H_2. SEATING IS DETERMINED BY FAILURE OF A 0.005" THICKNESS GAUGE 1/8" WIDE TO ENTER MORE THAN 1/16" BETWEEN SHOULDER SURFACE AND PLATE FLANGE. SLOTS ARE PROVIDED TO PERMIT THIS MEASUREMENT TO BE MADE.

6181
UHF POWER TETRODE

SKETCH G_1



THE CYLINDRICAL HOLES H_1 THROUGH H_8 HAVE AXES COINCIDENT WITHIN 0.001".

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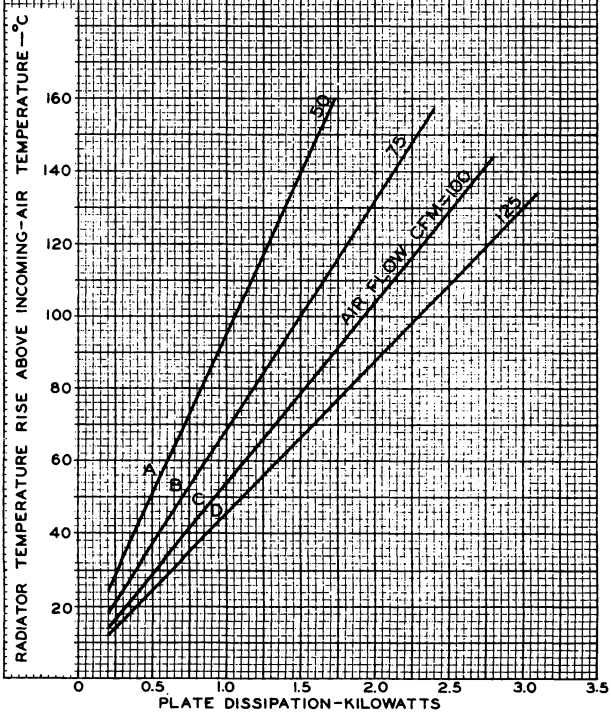
COOLING REQUIREMENTS

E_f = 120 VOLTS MAXIMUM RADIATOR TEMPERATURE = 180°C

CURVE	PRESSURE DROP INCHES OF WATER
A	0.25
B	0.56
C	1.00
D	1.55



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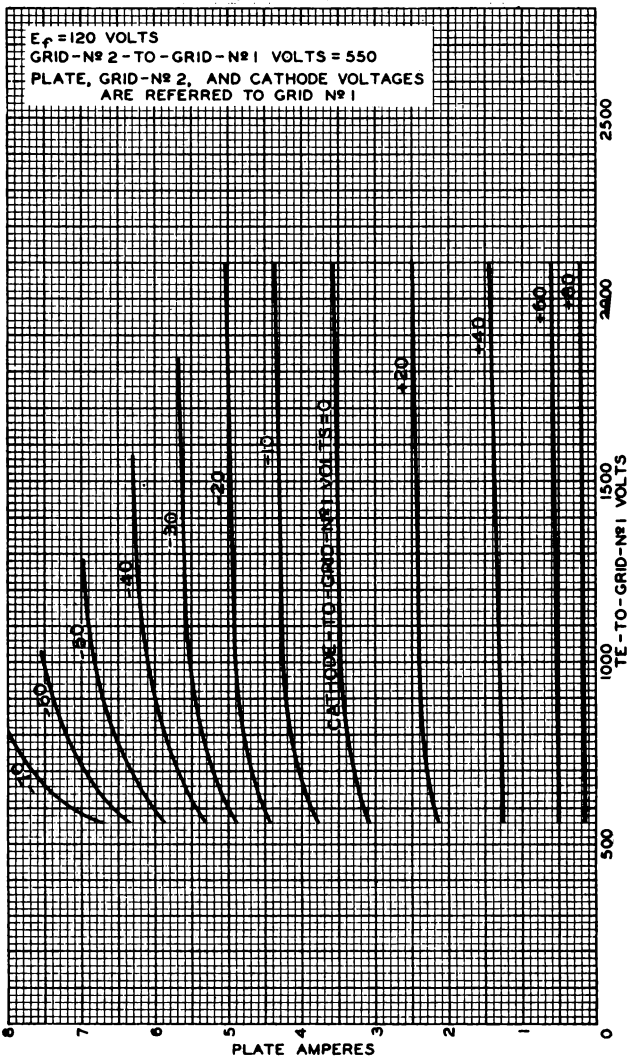
AVERAGE PLATE CHARACTERISTICS

FOR CATHODE-DRIVE OPERATION



MAR. 7, 1952

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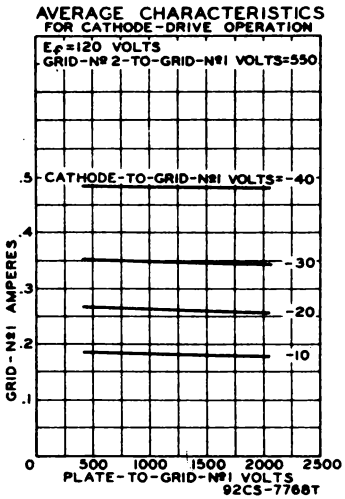
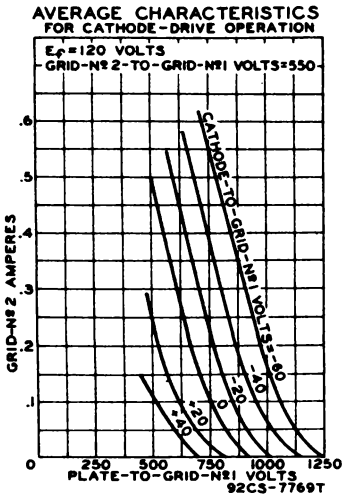
UHF POWER TETRODE





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BEAM POWER AMPLIFIER

FOR PULSE MODULATOR SERVICE

GENERAL DATA

Electrical:

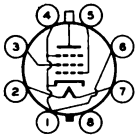
Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	1.25	amp
Transconductance, for plate volts = 200, grid-No.2 volts = 200, and plate ma. = 100	7300	μmhos
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 200, grid-No.2 volts = 200, and plate ma. = 100	4.5	
Direct Interelectrode Capacitances:*		
Grid No.1 to Plate	0.22 max.	μμf
Input	13.5	μμf
Output	8.5	μμf

Mechanical:

Mounting Position	Any
Overall Length	3-11/16" ± 1/8"
Seated Length	3-1/8" ± 1/8"
Maximum Diameter	1-23/32"
Bulb	T-12
Cap	Small (JETEC No.C1-1)
Base	Large-Wafer Octal 8-Pin with sleeve (JETEC No.B8-86)

BOTTOM VIEW

Pin 1 - Cathode, Grid No.3, Internal Shield
Pin 2 - Heater
Pin 3 - Grid No.2



Pin 4 - Same as Pin 1
Pin 5 - Grid No.1
Pin 6 - Same as Pin 1
Pin 7 - Heater
Pin 8 - Base Sleeve
Cap - Plate

Bulb Temperature (At hottest point) . . 175 max. °C

MODULATOR — Rectangular-Wave Modulation

Maximum and Minimum CCS● Ratings, *Absolute Values:*

For Duty Factor♦ Between 0.001 and 1.0 and Maximum Averaging Time of 10000 μsec in Any Interval

DC PLATE SUPPLY VOLTAGE (E_{bb})▲	See Rating Chart I	
INSTANTANEOUS PLATE VOLTAGE	115% of E_{bb}	
DC GRID-No.2 (SCREEN) SUPPLY VOLTAGE▲	500 max.	volts
DC GRID-No.1 (CONTROL-GRID) SUPPLY VOLTAGE▲	300 max. Minimum—See Rating Chart I	volts

* With no external shielding and base sleeve connected to ground.
● Continuous Commercial Service.

♦,▲: See next page.

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BEAM POWER AMPLIFIER

GRID-No.1 VOLTAGE:		
Instantaneous Negative Value	400 max.	volts
Peak Positive Value	100 max.	volts
PEAK PLATE CURRENT	See Rating Chart II	
PEAK GRID-No.2 CURRENT	0.75 max.	amp
PEAK GRID-No.1 CURRENT	0.5 max.	amp
PLATE INPUT	80 max.	watts
GRID-No.2 INPUT	1.75 max.	watts
GRID-No.1 INPUT	0.5 max.	watt
PLATE DISSIPATION#	See Rating Chart I	
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	135 max.	volts
Heater positive with respect to cathode	135 max.	volts

Typical Operation with Rectangular-Wave Shapes in Accompanying Test Circuit:

With Duty Factor♦ of 0.01

DC Plate Supply Voltage	3000	volts
DC Grid-No.2 Supply Voltage	300	volts
DC Grid-No.1 Supply Voltage	-175	volts
Peak Positive Grid-No.1 Voltage	65	volts
Plate Current:		
Peak	1.5	amp
DC	0.015	amp
DC Grid-No.2 Current	0.004	amp
DC Grid-No.1 Current	0.0025	amp
Load Resistance (R_L), 100 watts, non-inductive	1500 ± 5%	ohms

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	30000 max.	ohms

♦ *Duty Factor* for the 6293 is defined as the "on" time in microseconds divided by 10000 microseconds.

"On" Time is defined as the sum of the durations of all the individual pulses which occur during any 10000-microsecond interval.

"Pulse Duration" is defined as the time interval between the two points on the pulse at which the instantaneous value is 70% of the peak value. The peak value is defined as the maximum value of a smooth curve through the average of the fluctuations over the top portion of the pulse.

▲ For tube protection, it is essential that sufficient resistance be used in the plate supply circuit, the grid-No.2 supply circuit, and the grid-No.1 supply circuit so that the short-circuit current is limited to 0.5 ampere in each circuit.

\# Averaged over any interval not exceeding 10000 microseconds. Care should be used in determining the plate dissipation. A calculated value based on rectangular pulses can be considerably in error when the actual pulses have a finite rise and fall time. Plate dissipation should preferably be determined by measuring the bulb temperature under actual operating conditions; then, with the tube in the same socket and under the same ambient-temperature conditions, apply to the tube sufficient dc input to obtain the same bulb temperature. This value of dc input is a measure of the plate dissipation.

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BEAM POWER AMPLIFIER

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	1.175	1.325	amp
Grid-No.1-to-Plate Capacitance . .	2	-	0.22	μμf
Input Capacitance	2	11.1	15.9	μμf
Output Capacitance	2	6.4	10.6	μμf
Plate Current	3	46	94	ma
Grid-No.2 Current	3	0	5.5	ma
Peak Plate Current	1,4	2.4	-	amp

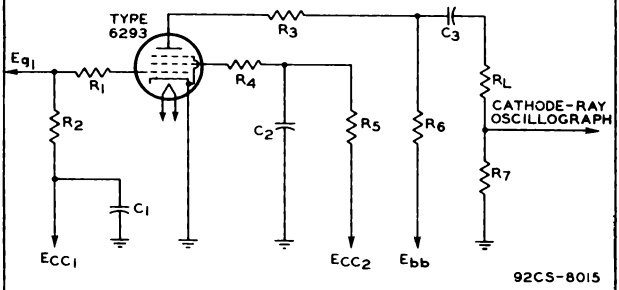
Note 1: With 6.3 volts ac on heater.

Note 2: With no external shield. Base sleeve (pin No.8) is grounded.

Note 3: With 6.3 volts ac on heater, dc plate voltage of 300 volts, dc grid-No.2 voltage of 200 volts, and dc grid-No.1 voltage of -33 volts.

Note 4: With the tube in the test circuit (below) under the following conditions: rectangular-wave modulation applied to grid No.1; pulse duration of 1 microsecond approx.; pulse repetition rate of 3000 cps approx.; dc plate supply voltage of 2000 volts; dc grid-No.2 supply voltage of 500 volts; dc grid-No.1 supply voltage of -300 volts; peak positive grid-No.1 swing of 100 volts; and load resistance (R_L) of 375 ± 5% ohms, 50 watts, non-inductive.

Test Circuit for Type 6293.



C_1: 0.1 μf, 600 v dc

C_2: 2 μf, 600 v dc

C_3: 0.25 μf, 5000 v dc

E_{cc1}: Grid-No.1 Supply Volt.

E_{cc2}: Grid-No.2 Supply Volt.

E_{bb}: Plate Supply Voltage

E_{g1}: Rectangular-Wave Signal Voltage

R_1: 20 ohms, 1 watt, non-inductive

R_2: 30000 ohms, 1 watt

R_3: 10 ohms, 5 watts, non-inductive

R_4: 25 ohms, 1 watt, non-inductive

R_5: 1000 ohms, 1 watt

R_6: 10000 ohms, 50 watts

R_7: 30 ± 1% ohms, non-inductive

R_L: For values, see Typical operation and Characteristics Range Values (Note 4)

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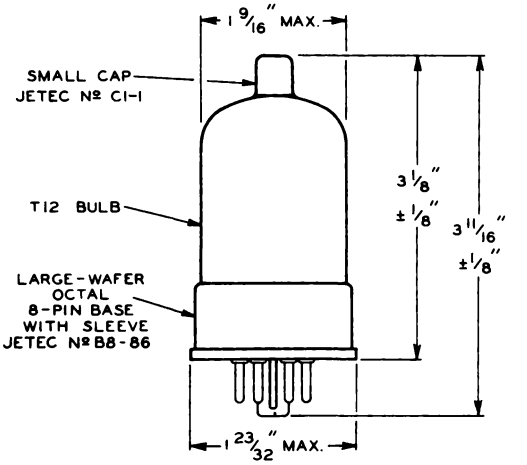
BEAM POWER AMPLIFIER



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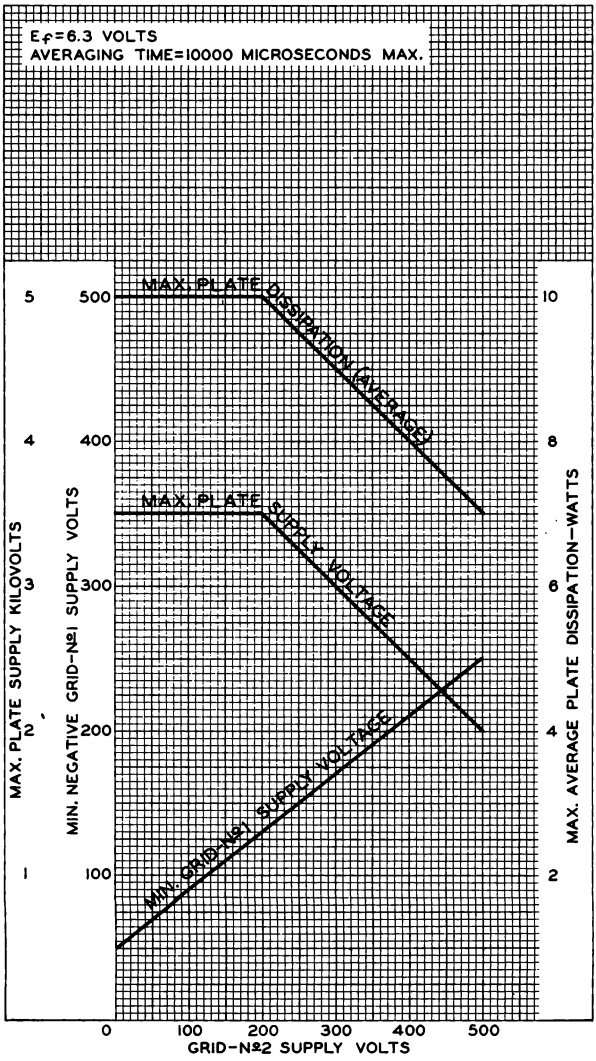
RATING CHART I



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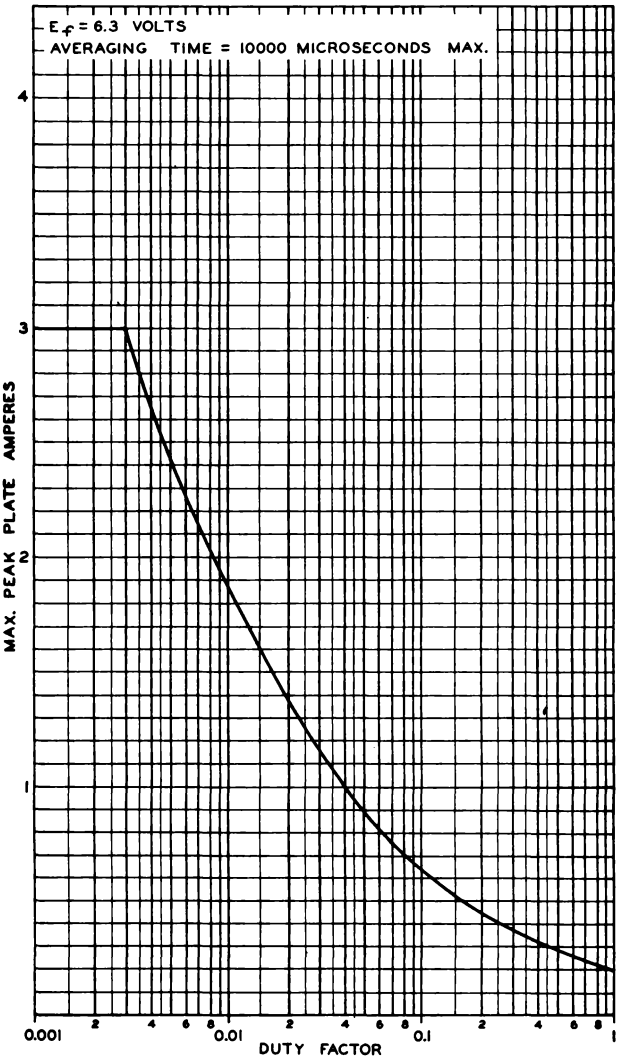
RATING CHART II



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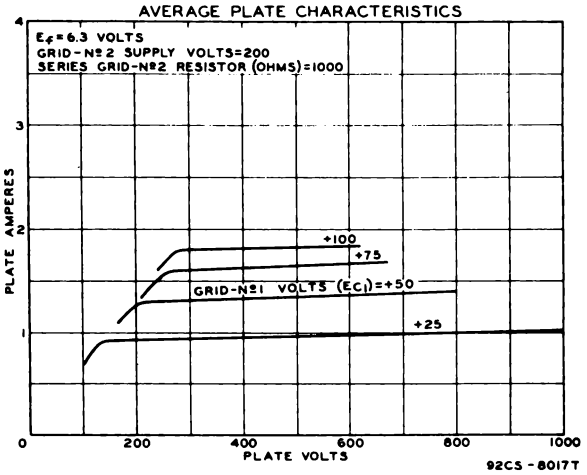
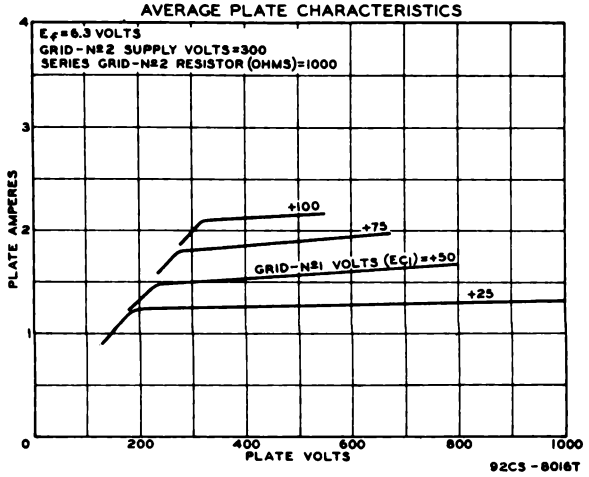
BEAM POWER AMPLIFIER





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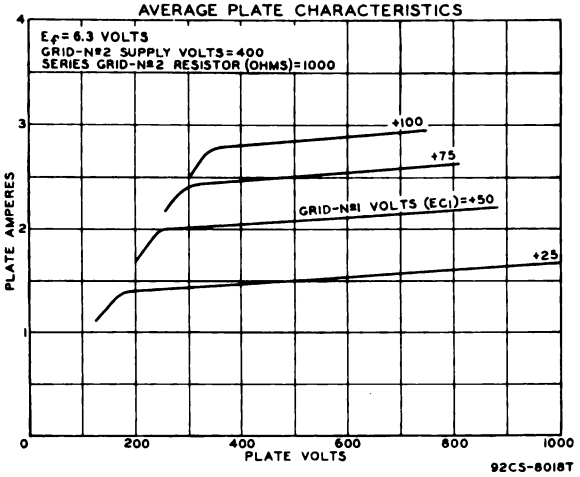
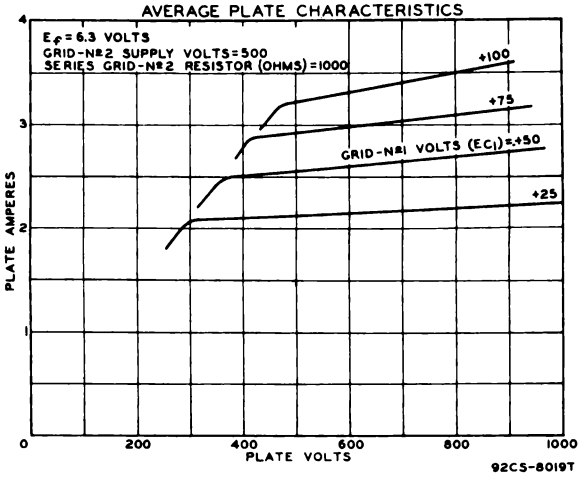
BEAM POWER AMPLIFIER





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POWER TRIODE

LIQUID AND FORCED-AIR COOLED

Full Input at Frequencies Up to 2000 Mc

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

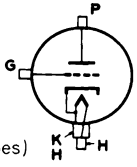
Voltage*	6.3 av. / 6.9 max.	ac or dc volts
Current	3.4	amp
Minimum heating time	1	minute
Amplification Factor	27	
Direct Interelectrode Capacitances:		
Grid to plate	6	μμf
Grid to cathode	11	μμf
Plate to cathode●	0.22	μμf

Mechanical:

Terminal Connections:

H - Heater Terminals (Center Pin at Cathode End & Cath. Terminal)

K - Cathode Terminal (End Opposite Pipes)



G - Grid Terminal (Between Plate Flange and Cath. Terminal)

P - Plate Terminal (Plate Flange)

Mounting Position	Any
Overall Length	4-3/16" ± 3/32"
Greatest Diameter	1.750" ± 0.010"
Cooling Jacket	Integral part of tube
Mounting	Special

Air Cooling:

Forced-air cooling of the grid terminal, cathode terminal, and glass envelope is required. The air flow must start with the application of any voltages, and be adequate to limit the temperature of the grid terminal, cathode terminal, and glass envelope to their respective maximum values. Heater power, plate power, and air flow may be removed simultaneously.

Liquid Cooling:

Liquid cooling of the plate is required. The liquid flow must start before the application of any voltages. Interlocking of the liquid flow with all power supplies is recommended to prevent tube damage in case of failure of adequate liquid flow. Suitable coolants are: Distilled Water, Butyl Carbitol, Ethylene Glycol, Monsanto OS45 (High Temperature Hydraulic Fluid), and Dow Corning No.200 Fluid.

Liquid-coolant pressure	60 max.	psi
Water flow required:		
With plate dissipation of 300 watts	0.25 min.	gpm
With plate dissipation of 600 watts	0.4 min.	gpm

● With external flat shield 7-1/2" minimum diameter located in plane of the grid terminal and perpendicular to axis of tube. Shield is connected to grid terminal.

*: See next page.

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POWER TRIODE

Water flow obtained:		
With pressure drop of 0.5 psi	0.25 min.	gpm
With pressure drop of 2.0 psi	0.4 min.	gpm
Outlet water temperature	70 max.	°C

For coolants other than water, the flow required, the pressure drop, and the outlet coolant temperature will depend on the characteristics of the coolant.

Plate Temperature (Measured on side of plate flange opposite the pipes and at junction of flange with tube body) . . .	180 max.	°C
Grid-Terminal Temperature	200 max.	°C
Cathode-Terminal Temperature	200 max.	°C
Glass-Envelope Temperature	175 max.	°C
Weight (Approx.)	8	ounces

AF POWER AMPLIFIER & MODULATOR--Class A

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1500 max.	volts
DC GRID VOLTAGE	-300 max.	volts
DC PLATE CURRENT	400 max.	ma
DC GRID CURRENT	75 max.	ma
PLATE INPUT	600 max.	watts
PLATE DISSIPATION	600 max.	watts

Typical Operation (Class A_1):

DC Plate Voltage	1000	1500	volts
DC Grid Voltage	-25	-40	volts
Peak AF Grid Voltage	20	35	volts
DC Plate Current	200	250	ma
Load Resistance	1350	1550	ohms
Power Output♦	20	60	watts

PLATE-MODULATED RF POWER AMP.--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1200 max.	volts
DC GRID VOLTAGE	-300 max.	volts
DC PLATE CURRENT	335 max.	ma
DC GRID CURRENT	See Rating Chart	
PLATE INPUT	400 max.	watts
PLATE DISSIPATION	400 max.	watts

♦ Values are based on maximum power output disregarding distortion.

*,●: See next page.

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POWER TRIODE

Typical Operation:

In Cathode-Drive Circuit at	*600 Mc*	*1000 Mc*	
Heater Voltage*.	5.7	4.5	volts
DC Plate-to-Grid Voltage . . .	1340	1315	volts
DC Cathode-to-Grid Voltage . .	140	115	volts
From cathode resistor of▲. .	380	330	ohms
Peak RF Cathode-to-Grid Voltage	200	175	volts
DC Plate Current	335	335	ma
DC Grid Current (Approx.). . .	35	15	ma
Driver Power Output (Approx.)✱■	70	76	watts
Output-Circuit Efficiency (Approx.). .	80	60	per cent
Useful Power Output (Approx.).	250○○	190○○	watts

In Cathode-Drive Circuit at	*1100 Mc*	*1500 Mc*	
Heater Voltage*.	4.5	4.5	volts
DC Plate-to-Grid Voltage . . .	1290	1280	volts
DC Cathode-to-Grid Voltage . .	90	80	volts
From cathode resistor of▲. .	260	235	ohms
Peak RF Cathode-to-Grid Voltage	145	130	volts
DC Plate Current	335	335	ma
DC Grid Current (Approx.). . .	12	4	ma
Driver Power Output (Approx.)✱■	80	53	watts
Output-Circuit Efficiency (Approx.). .	55	50	per cent
Useful Power Output (Approx.).	160○○	100○○	watts

RF POWER AMPLIFIER & OSC.--Class C Telegraphy□ and RF POWER AMPLIFIER--Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1500 max.	volts
DC GRID VOLTAGE	-300 max.	volts
DC PLATE CURRENT	400 max.	ma
DC GRID CURRENT	See Rating Chart	
PLATE INPUT	600 max.	watts
PLATE DISSIPATION	600 max.	watts

Typical Operation:

As Amplifier in Cathode-Drive Circuit at	*600 Mc*	*1000 Mc*	
Heater Voltage*.	5.7	4.5	volts
DC Plate-to-Grid Voltage . . .	1640	1615	volts

■ In cathode-drive, plate-modulated class C rf power amplifier service, the 6383 can be modulated 100% if the rf driver stage is also modulated 100% simultaneously. Care should be taken to insure that the driver-modulation and amplifier-modulation voltages are exactly in phase.

□ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

*,●,▲,✱,○○: See next page.

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POWER TRIODE

	600 Mc	1000 Mc	
DC Cathode-to-Grid Voltage . .	140	115	volts
From cathode resistor of▲. .	315	275	ohms
Peak RF Cathode-to-Grid Voltage	210	185	volts
DC Plate Current	400	400	ma
DC Grid Current (Approx.). . .	25	20	ma
Driver Power Output (Approx.)●	90	95	watts
Output-Circuit Efficiency (Approx.). .	80	60	per cent
Useful Power Output (Approx.).	380oo	285oo	watts
As Amplifier in Cathode-Drive Circuit at	***1100 Mc***	***1500 Mc***	
Heater Voltage*.	4.5	4.5	volts
DC Plate-to-Grid Voltage . . .	1590	1580	volts
DC Cathode-to-Grid Voltage . .	90	80	volts
From cathode resistor of▲. .	220	200	ohms
Peak RF Cathode-to-Grid Voltage	155	140	volts
DC Plate Current	400	400	ma
DC Grid Current (Approx.). . .	15	5	ma
Driver Power Output (Approx.)●	80	85	watts
Output-Circuit Efficiency (Approx.). .	55	50	per cent
Useful Power Output (Approx.).	240oo	150oo	watts
As Oscillator in Cathode-Drive Circuit at	***600 Mc***	***1000 Mc***	
Heater Voltage*.	5.7	4.5	volts
DC Plate-to-Grid Voltage . . .	1640	1615	volts
DC Cathode-to-Grid Voltage . .	140	115	volts
From cathode resistor of▲. .	315	275	ohms
Peak RF Cathode-to-Grid Voltage	175	140	volts
DC Plate Current	400	400	ma
DC Grid Current (Approx.). . .	45	20	ma
Output-Circuit Efficiency (Approx.). .	80	60	per cent
Useful Power Output (Approx.).	280oo	190oo	watts
As Oscillator in Cathode-Drive Circuit at	***1100 Mc***	***1500 Mc***	
Heater Voltage*.	4.5	4.5	volts
DC Plate-to-Grid Voltage . . .	1590	1580	volts
DC Cathode-to-Grid Voltage . .	90	80	volts
From cathode resistor of▲. .	220	200	ohms
Peak RF Cathode-to-Grid Voltage	120	110	volts
DC Plate Current	400	400	ma
DC Grid Current (Approx.). . .	15	5	ma
Output-Circuit Efficiency (Approx.). .	55	50	per cent
Useful Power Output (Approx.).	150oo	60oo	watts

*,●,▲,✱,oo: See next page.

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POWER TRIODE

FREQUENCY MULTIPLIER--Class C

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1500 max.	volts
DC GRID VOLTAGE	-300 max.	volts
DC PLATE CURRENT	400 max.	ma
DC GRID CURRENT	See Rating Chart	
PLATE INPUT	600 max.	watts
PLATE DISSIPATION	600 max.	watts

Typical Operation in Cathode-Drive Circuit:

	Doubler to 600 Mc	*Doubler to 900 Mc*	
DC Plate-to-Grid Voltage	1760	1675	volts
DC Cathode-to-Grid Voltage	260	175	volts
From cathode resistor of▲	570	415	ohms
Peak RF Cathode-to-Grid Voltage	300	215	volts
DC Plate Current	400	400	ma
DC Grid Current (Approx.)	55	25	ma
Driver Power Output (Approx.)●	195	160	watts
Output-Circuit Efficiency (Approx.)	80	60	per cent
Useful Power Output (Approx.)	280○○	225○○	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	3.05	3.75	amp
Amplification Factor	1,2	20	34	
Grid-Plate Capacitance	-	5.5	6.5	μμf
Grid-Cathode Capacitance	-	9.6	12.4	μμf
Plate-Cathode Capacitance	3	0.12	0.32	μμf
Plate Voltage (1)	1,4	550	810	volts
Plate Voltage (2)	1,5	750	1150	volts
Grid Voltage	1,6	-	-165	volts
Peak Cathode Current	1,7	9	-	amp
Useful Power Output	8,9	140	-	watts

Note 1: With 6.3 volts ac on heater.

Note 2: With dc grid voltage of -15 volts, and dc plate voltage adjusted to give dc plate current of 250 milliamperes.

Note 3: With external shield as described under (●).

Note 4: With dc grid voltage of -10 volts, and dc plate voltage adjusted to give dc plate current of 250 milliamperes.

Note 5: With dc grid voltage of -20 volts, and dc plate voltage adjusted to give dc plate current of 250 milliamperes.

Note 6: With dc plate voltage of 1500 volts, and dc grid voltage adjusted to give dc plate current of 1.0 milliampere.

*,●,▲,◆,○○: See next page.

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POWER TRIODE

Note 7: Designers should limit the maximum useable cathode current (plate current and grid current) to this value under any condition of operation.

Note 8: With 4.5 volts ac on heater.

Note 9: In a self-excited, cathode-drive oscillator circuit and with dc plate-to-grid voltage of 1570 to 1625 volts (in all cases, plate-to-cathode voltage is 1500 volts), dc plate current of 400 ma., dc grid current of -10 to +50 ma., cathode-to-grid voltage of 70 to 125 volts, and frequency of 1100 Mc.

* Operation should always be started with a heater voltage of 6.3 volts. Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced in accord with the following table to prevent overheating the cathode and resultant short life.

Approx. Frequency Range Mc	*Heater Volts*
Up to 550-600	6.3
550 to 750-800	5.7
750 to 975-1025	5.1
975 and above	4.5

● Continuous Commercial Service.

▲ At frequencies below 600 Mc, it is permissible to use a combination of grid and cathode resistors, but the use of a grid resistor alone is not recommended. At frequencies above 600 Mc where the value of grid current may be small, only cathode bias is recommended.

● The driver stage is required to supply tube losses, rf circuit losses, and rf power added to plate input. The driver stage should be designed to provide an excess of power above the indicated value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

oo This value of useful power is measured at load of output circuit having indicated efficiency.

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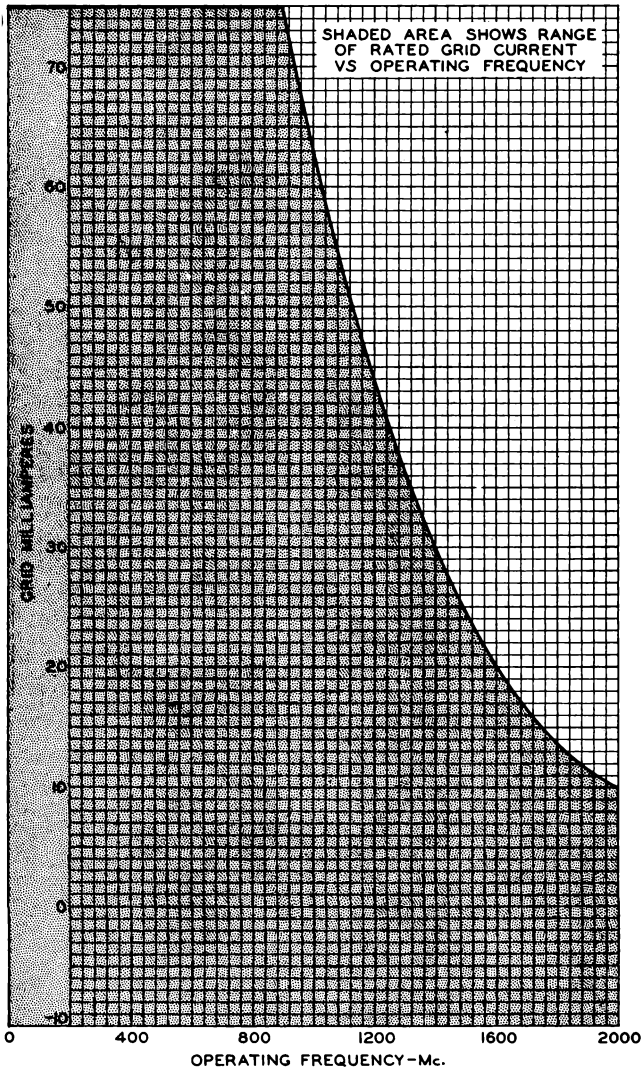
RATING CHART



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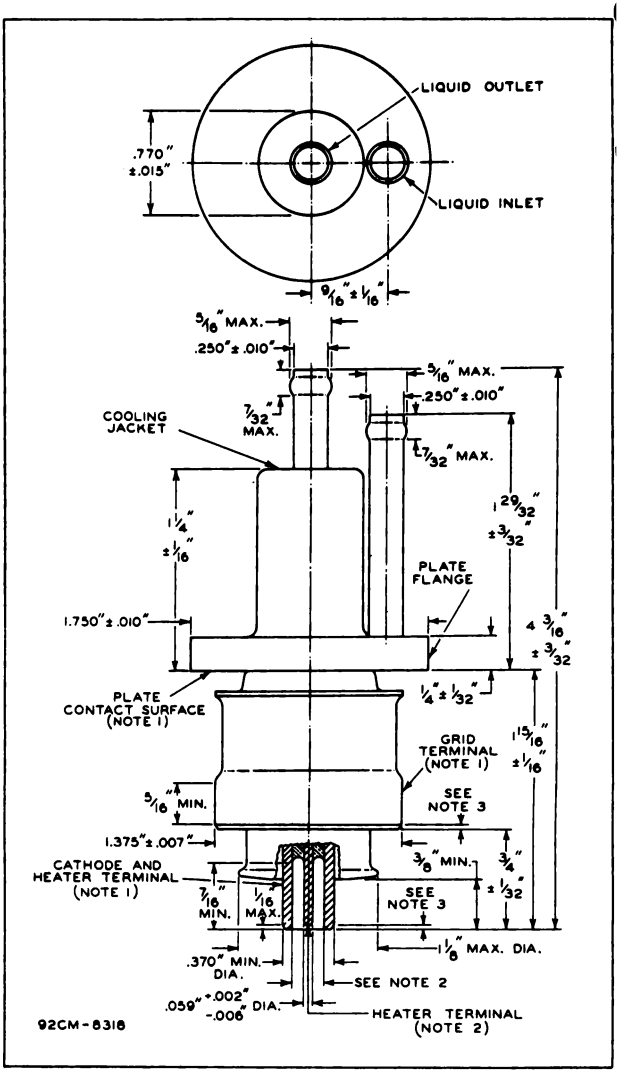
POWER TRIODE



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POWER TRIODE

NOTE 1: WITH THE CYLINDRICAL SURFACES OF ITS GRID AND CATHODE TERMINALS CLEAN, SMOOTH, AND FREE OF BURRS, THE TUBE WILL ENTER A GAUGE AS SHOWN IN SKETCH G_1. THE FOUR CYLINDRICAL HOLES H_1, H_2, H_3, and H_4 HAVE AXES COINCIDENT WITHIN 0.0005", LENGTHS DETERMINED FROM THE DIMENSIONAL OUTLINE, AND SUCCESSIVELY SMALLER DIAMETERS AS SHOWN IN THE SKETCH.

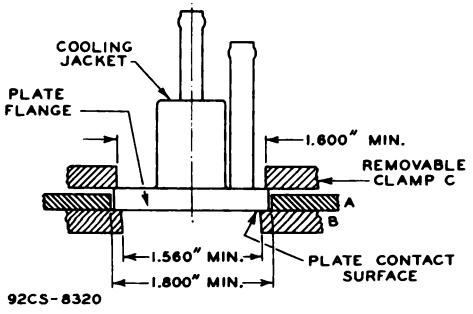
THE PLATE FLANGE WILL BE ENTIRELY ENGAGED BY HOLE H_1, AND CONTACT SURFACE OF THE PLATE FLANGE WILL SEAT ON THE SHOULDER BETWEEN HOLES H_1 AND H_2. THE PLANE SURFACE OF THIS SHOULDER IS $90^{\circ} \pm 2'$ TO THE AXES OF THE HOLES. SEATING IS DETERMINED BY FAILURE OF A 0.005" THICKNESS GAUGE, 1/8" WIDE, TO ENTER MORE THAN 1/16" BETWEEN THIS SHOULDER SURFACE AND THE PLATE CONTACT SURFACE.

WITH THE TUBE PROPERLY SEATED AS DESCRIBED ABOVE, THE GRID TERMINAL WILL BE ENTIRELY ENGAGED BY HOLE H_3, AND THE CATHODE TERMINAL WILL BE ENGAGED BY HOLE H_4 TO A DEPTH OF AT LEAST 1/4".

NOTE 2: CONCENTRICITY OF THE HEATER TERMINAL WITH RESPECT TO THE CATHODE TERMINAL IS DETERMINED BY A GAUGE AS SHOWN IN SKETCH G_2. THE CYLINDRICAL HOLE H_5 AND THE ANNULAR HOLE H_6 HAVE AXES COINCIDENT WITHIN 0.0005". THE CATHODE TERMINAL AND THE HEATER TERMINAL WILL ENTER THIS GAUGE TO A DEPTH OF 3/8".

NOTE 3: MAY BE ROUNDED OR BEVELED NOT TO EXCEED 1/16".

Mounting Arrangement for Use with Coaxial-Line or Cavity Circuits



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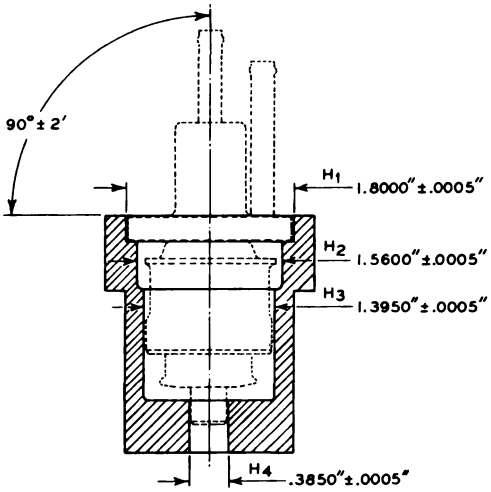
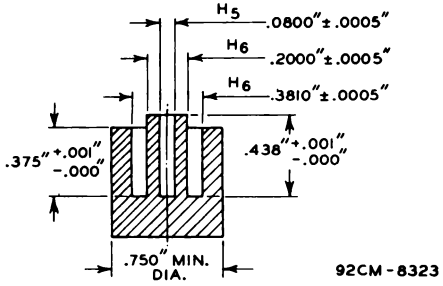
POWER TRIODE

Sketch G_1



Sketch G_2



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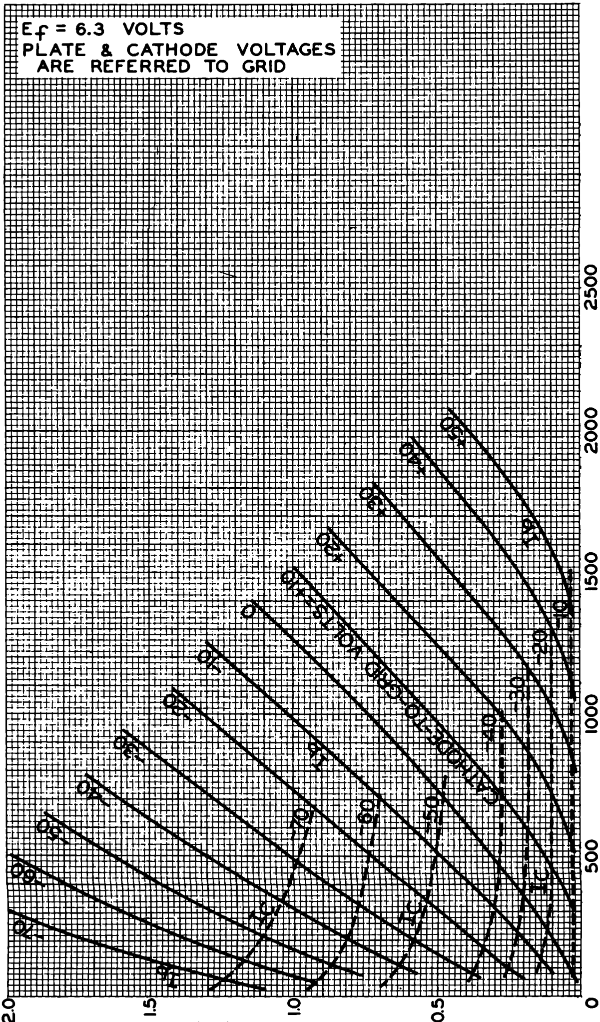
AVERAGE CHARACTERISTICS



APRIL 26, 1954

TUBE DIVISION

92CL-7771R1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6417

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VHF BEAM POWER TUBE

9 PIN MINIATURE TYPE

Heater, for Unipotential Cathode:

Voltage	12.6 ± 10%	ac or dc volts
Current	0.375	amp

Except for heater rating, the 6417 is the same as the 5763.

With 12.6 volts on heater of the 6417, the minimum heater current is 0.345 ampere and the maximum heater current is 0.405 ampere.

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UHF BEAM POWER TUBE

WATER-COOLED ELECTRODES

GENERAL DATA

Electrical:

Filament*, 2-Section Multi-strand Thoriated Tungsten:

Voltage per section (AC or DC)	1.35 av. 1.50 max.	volts volts
Current per section at 1.35 volts	1000	amp
Starting current per section	Must never exceed 1500 amperes, even momentarily	
Cold resistance per section	0.0002	ohm
Minimum heating time	10	seconds
Supply circuits	See Circuits	
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 3000, grid-No.2 volts = 800, and plate amperes = 4	6	

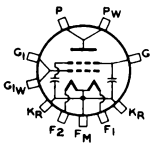
Direct Interelectrode Capacitances:

Grid No.1 to plate	0.1 max.	μμf
Input	335	μμf
Output	30	μμf
Internal Bypass Capacitors between Grid No.2 and Cathode (Total)	15000	μμf

Mechanical:

Terminal Connections:

F_1 - Fil. Sect. No.1 & Water Conn.
F_2 - Fil. Sect. No.2 & Water Conn.
G_1 - RF Grid-No.1 Term. Contact Surface
G_{1W} - DC Grid-No.1 & Water Conn.
G_2 - DC Grid-No.2 & Water Conn.



For location of respective terminals, see Dimensional Outline

K_R - RF Cath. Term. Contact Surface For Circuit Returns
F_M - Common Point of Fil. Sections & Water Conn.
P - RF Plate Term. Contact Surface
P_W - DC Plate & Water Conn.

Mounting Position . . . . . Tube axis vertical, with plate terminal either up or down
Overall Length . . . . . 7-11/32" +3/8" -1/2"
Maximum Diameter . . . . . 11-3/8"

Air Cooling:

Forced-air cooling of the ceramic bushing at the grid-No.1 seal and at the plate seal is required only if the temperature of the ceramic bushing at either seal exceeds the specified maximum value of 150°C. Under such conditions, provision should be made for blowing air at the ceramic bushings through suitable openings in the coaxial-cylinder cavity circuit.

*: See Operating Notes on conserving filament life.

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UHF BEAM POWER TUBE

Water Cooling:

Water cooling of the filament-section blocks, rf cathode terminals, grid-No.1 block, grid-No.2 block, and plate is required. The water flow must start before application of any voltage and preferably should continue for several seconds after removal of all voltages. Interlocking of the water flow through each of the cooled elements with all power supplies is recommended to prevent tube damage in case of failure of adequate water flow.

Water Flow:

	Min. *gpm*	*Typical* *gpm*	*Pressure Drop●* *psi*
To Filament-Section-No.1 Block	0.5	0.5	2
		1.2	11
To Filament-Section-No.2 Block	0.5	0.5	2
		1.2	11
To Filament Mid-Tap Block	0.5	0.5	2
		1.2	10
To Grid-No.1 Block	0.5	0.5	1
		1.2	6
To Grid-No.2 Block	0.5	0.5	3
		1.2	15
To Plate:			
For plate dissipation of 10 kw	4.5	-	3.5
For plate dissipation of 15 kw	7.5	-	8.5
For plate dissipation of 20 kw	11	-	16
For plate dissipation of 26 kw	14	-	25

Gauge Pressure at Any Inlet	70 max.	psi
Ceramic Bushing Temperature	150 max.	°C
Outlet Water Temperature (Any outlet)	70 max.	°C
Weight (Approx.)	25	lbs

RF POWER AMPLIFIER--Class B Television Service

Synchronizing-level conditions per tube unless otherwise indicated

Maximum CCS● Ratings, *Absolute Values:*

	Up to 1000 Mc	
DC PLATE VOLTAGE	7000 max.	volts
DC PLATE-SUPPLY VOLTAGE	8000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	1000 max.	volts
DC GRID-No.2-SUPPLY VOLTAGE	1100 max.	volts

● Directly across cooled element for the indicated flow.

●: See next page.

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UHF BEAM POWER TUBE

DC PLATE CURRENT	7 max.	amp
DC GRID-No.1 (CONTROL-GRID) CURRENT	0.5 max.	amp
PLATE INPUT	49000 max.	watts
GRID-No.2 INPUT (Pedestal Level)	600 max.	watts
PLATE DISSIPATION	26000 max.	watts

Typical Operation:

Bandwidth▲ of	*At 500 Mc* 7	*At 900 Mc* 7	*Mc*
DC Plate Voltage	6000	6500	volts
DC Grid-No.2 Voltage	950	950	volts
DC Grid-No.1 Voltage	-140	-140	volts
Peak RF Grid-No.1 Voltage:			
Synchronizing level	160	160	volts
Pedestal level	100	100	volts
DC Plate Current:			
Synchronizing level	6.9	6.8	amp
Pedestal level	5.3	5.2	amp
DC Grid-No.2 Current:			
Synchronizing level	0.75	0.6	amp
Pedestal level	0.35	0.3	amp
DC Grid-No.1 Current (Approx.):			
Synchronizing level	0.13	0.1	amp
Pedestal level	0	0	amp
Driver Power Output (Approx.):♣			
Synchronizing level	600	1000	watts
Pedestal level	350	560	watts
Output-Circuit Efficiency (Approx.)	85	80	per cent
Useful Power Output (Approx.):			
Synchronizing level	15000●●	12000●●	watts
Pedestal level	8400●●	6700●●	watts

PLATE-MODULATED RF POWER AMP.--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

	Up to 1000 Mc	
DC PLATE VOLTAGE	4500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	1000 max.	volts
PEAK GRID-No.2 VOLTAGE (DC + AC Component)	1200 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-300 max.	volts
DC PLATE CURRENT	4.5 max.	amp
DC GRID-No.1 CURRENT	1 max.	amp
PLATE INPUT	22500 max.	watts

▲ Between the half-power points as measured in the output circuit.

●, ♣, ●●: See next page.

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UHF BEAM POWER TUBE

GRID-No.2 INPUT	400 max.	volts
PLATE DISSIPATION	16500 max.	watts

Typical Operation:	*At 400 Mc*	*At 900 Mc*	
DC Plate Voltage	4000	4250	volts
DC Grid-No.2 Voltage♦	600	600	volts
DC Grid-No.1 Voltage	-200	-200	volts
Peak RF Grid-No.1 Voltage	210	210	volts
DC Plate Current	4.25	4	amp
DC Grid-No.2 Current	0.65	0.6	amp
DC Grid-No.1 Current (Approx.)	0.3	0.2	amp
Driver Power Output (Approx.)♣	700	1000	watts
Output-Circuit Efficiency (Approx.)	80	75	per cent
Useful Power Output (Approx.)	7250●●	4500●●	watts

RF POWER AMPLIFIER--Class C Telegraphy□ and RF POWER AMPLIFIER--Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*

	Up to 1000 Mc	
DC PLATE VOLTAGE	7000 max.	volts
DC PLATE-SUPPLY VOLTAGE	8000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	1000 max.	volts
DC GRID-No.2-SUPPLY VOLTAGE	1100 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-300 max.	volts
DC PLATE CURRENT	6.5 max.	amp
DC GRID-No.1 CURRENT	0.5 max.	amp
PLATE INPUT	45500 max.	watts
GRID-No.2 INPUT	600 max.	watts
PLATE DISSIPATION	26000 max.	watts

Typical Operation:	*At 400 Mc*	*At 900 Mc*	
DC Plate Voltage	6500	6500	volts
DC Grid-No.2 Voltage†	800	800	volts
DC Grid-No.1 Voltage††	-140	-140	volts
Peak RF Grid-No.1 Voltage	160	160	volts
DC Plate Current	6	6.3	amp
DC Grid-No.2 Current	0.5	0.4	amp
DC Grid-No.1 Current (Approx.)	0.2	0.15	amp
Driver Power Output (Approx.)♣	400	800	watts
Output- Circuit Efficiency (Approx.)	85	77	per cent
Useful Power Output (Approx.)	14000●●	11000●●	watts

● Continuous Commercial Service.

♦ Obtained preferably from a separate source.

□,●●,♣,†,††: See next page.

UHF BEAM POWER TUBE

□ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

♣ The driver stage is required to supply tube losses and rf circuit losses. The driver stage should be designed to provide an excess of power above the indicated value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

●● This value of useful power is measured at load of output circuit having indicated efficiency.

† Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should not be used if the 6448 or a preceding stage is keyed. In this case, the regulation of the source should be sufficient to prevent the grid-No.2 voltage from rising above 1100 volts under key-up conditions; and additional fixed grid-No.1 bias must be provided to limit the plate current.

†† Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current per Section .	1	900	1100	amp
Filament Current per Section .	2	960	1160	amp
Grid-No.1 Voltage	1,3	–	-160	volts
Useful Power Output	1,4	11000	–	watts
Power Gain	1,4,5	10	–	

Note 1: With 1.35 volts ac per section.

Note 2: With 1.5 volts ac per section.

Note 3: With 2-phase excitation of the filament sections, dc plate voltage of 6500 volts, dc grid-No.2 voltage of 800 volts, and dc grid-No.1 voltage adjusted to give a dc plate current of 0.5 ampere.

Note 4: With 2-phase excitation of the filament sections. In rf power amplifier circuit having bandwidth of 7 Mc as defined by the half-power points and with dc plate voltage of 7000 volts, dc grid-No.2 voltage of 800 volts, dc grid-No.1 voltage of -130 volts, drive adjusted to give dc plate current of 6.75 amperes, and frequency of 900 Mc.

Note 5: With driving power measured at input to input-cavity circuit fed by transmission line having voltage-standing-wave ratio not greater than 2. Power gain is ratio of useful power output to driving power.

OPERATING NOTES

Instructions for conserving filament life of the 6448 and for the use of high-speed electronic protective devices with it are given in the technical bulletin. A copy of the technical bulletin for the 6448 will be supplied on request to Commercial Engineering, RCA, Harrison, N.J.

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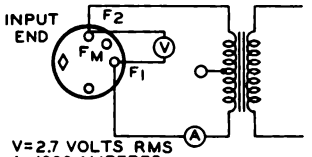
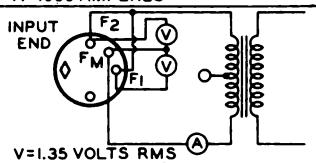
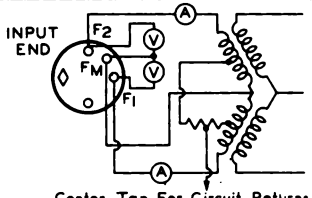
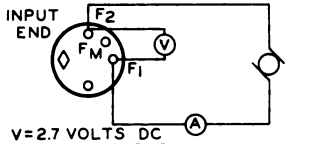
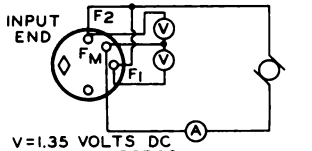
FILAMENT-SUPPLY CIRCUITS

WITH SINGLE-PHASE AC EXCITATION	SECTIONS IN SERIES	 V=2.7 VOLTS RMS A=1000 AMPERES
	SECTIONS IN PARALLEL	 V=1.35 VOLTS RMS A=2000 AMPERES
WITH TWO-PHASE (QUARTER PHASE) AC EXCITATION		 Center Tap For Circuit Returns V=1.35 VOLTS RMS A=1000 AMPERES
WITH DC EXCITATION	SECTIONS IN SERIES	 V=2.7 VOLTS DC A=1000 AMPERES
	SECTIONS IN PARALLEL	 V=1.35 VOLTS DC A=2000 AMPERES

F_1 = FILAMENT SECTION Nº1
F_2 = FILAMENT SECTION Nº2
F_M = COMMON POINT OF FILAMENT SECTIONS

92CM-8249

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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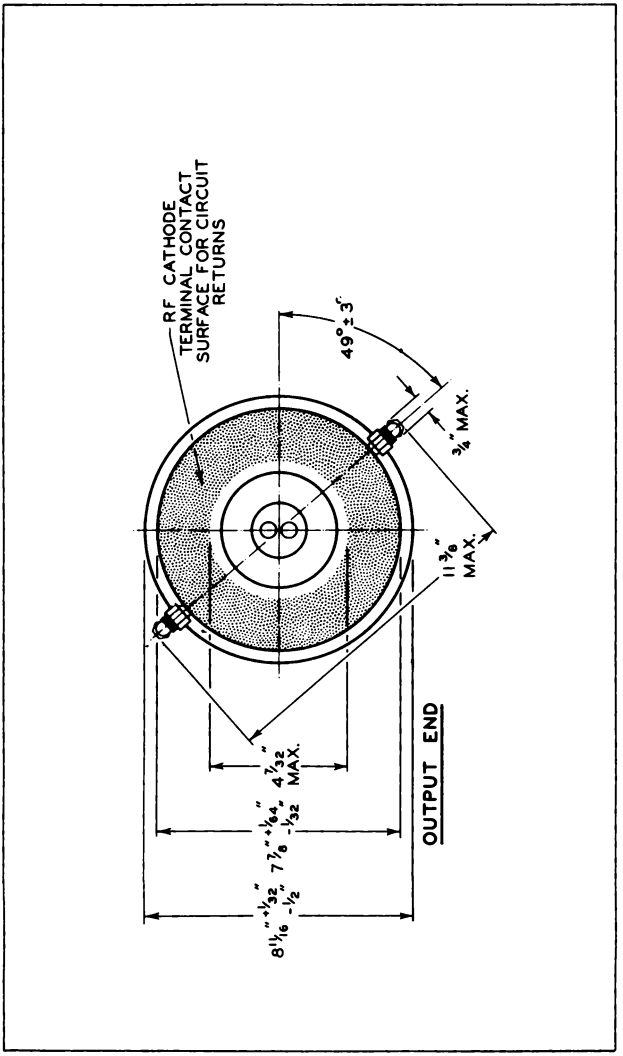
UHF BEAM POWER TUBE



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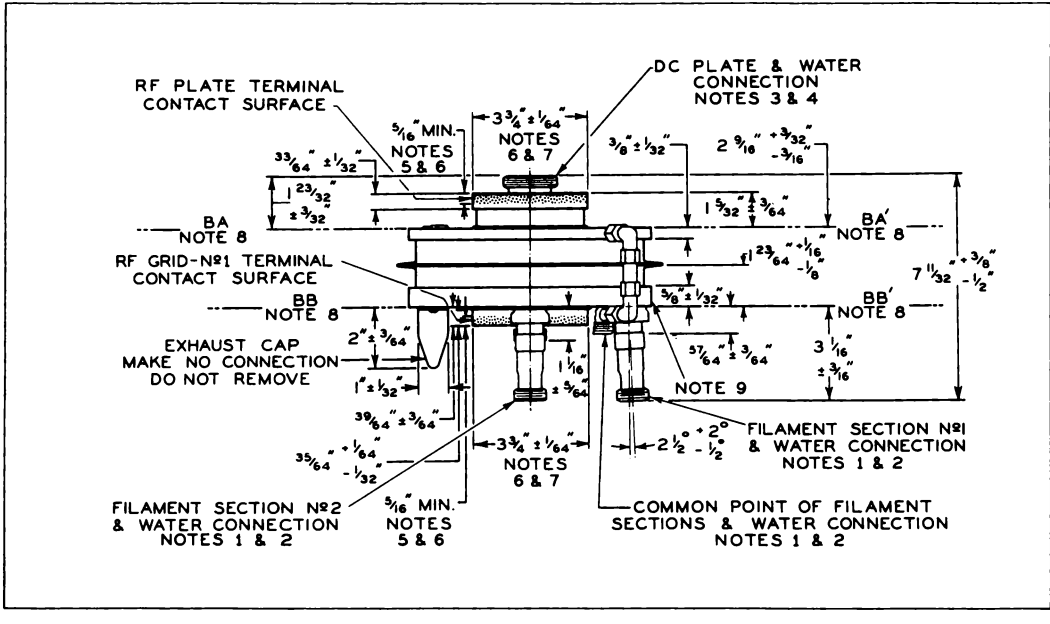
UHF BEAM POWER TUBE



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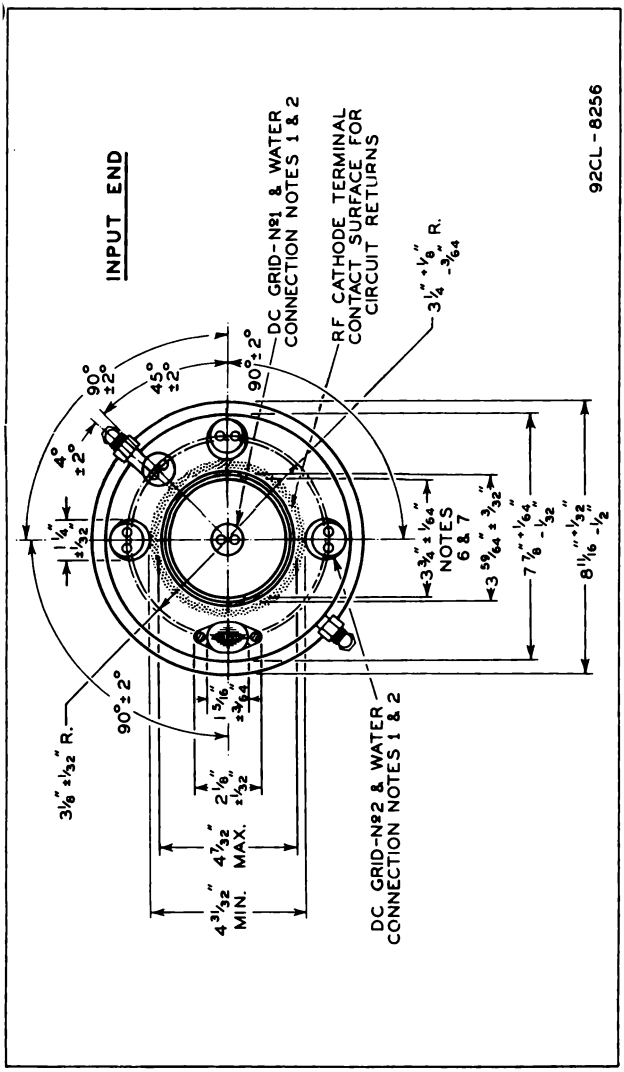
UHF BEAM POWER TUBE



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UHF BEAM POWER TUBE

NOTE 1: WATER CONNECTIONS FOR FILAMENT SECTIONS No.1 AND No.2, COMMON POINT OF FILAMENT SECTIONS, GRID No.1, AND GRID No.2 HAVE 1" -16 AMERICAN STANDARD THREAD, FREE FIT (CLASS 2), 3/8" LONG, AND 2 HOLES 0.257" - 0.270" DIAMETER SPACED 7/16" ON CENTERS.

NOTE 2: THE HOLES IN THE INDICATED WATER CONNECTIONS OF NOTE 1 WILL ACCEPT THE PINS OF THE PLUG-AND-CYLINDER COMBINATION GAUGE SHOWN IN SKETCH G_1.

NOTE 3: WATER CONNECTION FOR THE PLATE HAS 1-3/4"-16 AMERICAN STANDARD THREAD, FREE FIT (CLASS 2), 3/8" LONG, AND 2 HOLES 0.508"-0.522" DIAMETER SPACED 11/16" ON CENTERS.

NOTE 4: THE HOLES IN THE PLATE WATER CONNECTION WILL ACCEPT THE PINS OF THE PLUG-AND-CYLINDER COMBINATION GAUGE SHOWN IN SKETCH G_2.

NOTE 5: CONTACT LENGTH OF CIRCUIT CONNECTOR IS 5/16" MAX.

NOTE 6: THIS DIAMETER DIMENSION IS HELD ONLY OVER A LENGTH OF 5/16"; OVER REMAINDER OF LENGTH, THE DIAMETER MAY INCREASE TO 3-7/8" MAX.

NOTE 7: THE AXIS OF THE RF PLATE CONTACT SURFACE IS COINCIDENT WITH THE AXIS OF THE RF GRID-No.1 CONTACT SURFACE WITHIN 3/32".

NOTE 8: THE CONTACT SURFACES BA-BA' AND BB-BB' ARE PARALLEL WITHIN 1/16".

NOTE 9: SERIAL NUMBER IS LOCATED ON THIS SURFACE BETWEEN DC GRID-NO.2 AND FILAMENT SECTION No.1 CONNECTIONS.

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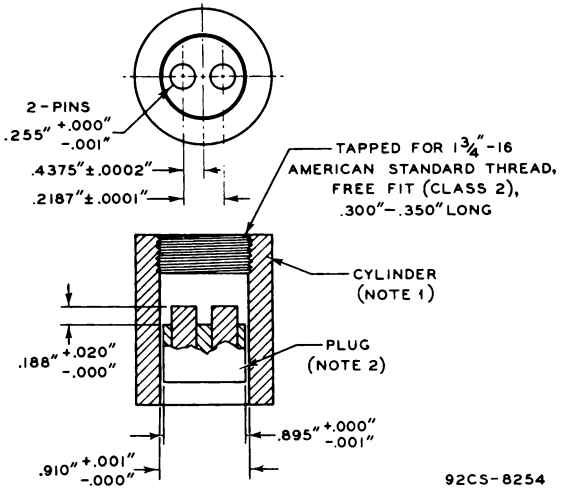
UHF BEAM POWER TUBE

GAUGE SKETCH G_1



NOTE 1: TAPPED SECTION OF CYLINDER MUST BE CONCENTRIC WITH UNTAPPED SECTION OF CYLINDER WITHIN .002".

NOTE 2: PLUG SIDES & PIN SIDES MUST BE PARALLEL WITHIN .001".

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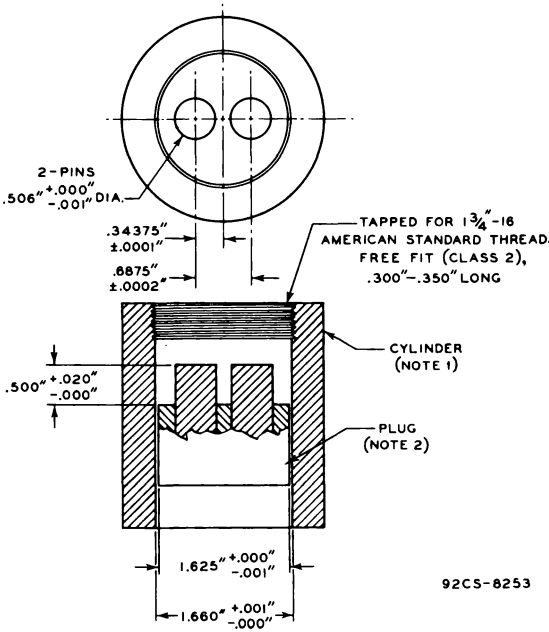
UHF BEAM POWER TUBE

GAUGE SKETCH G_2



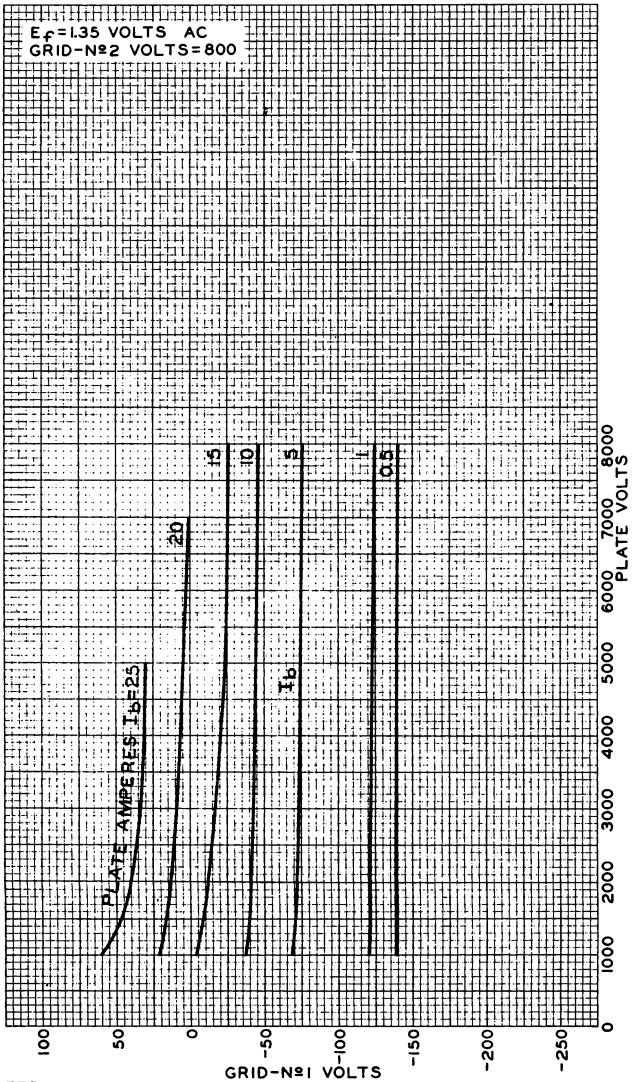
NOTE 1: TAPPED SECTION OF CYLINDER MUST BE CONCENTRIC WITH UNTAPPED SECTION OF CYLINDER WITHIN .002".

NOTE 2: PLUG SIDES & PIN SIDES MUST BE PARALLEL WITHIN .001".

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6448

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



FEB. 24,1954

TUBE DIVISION

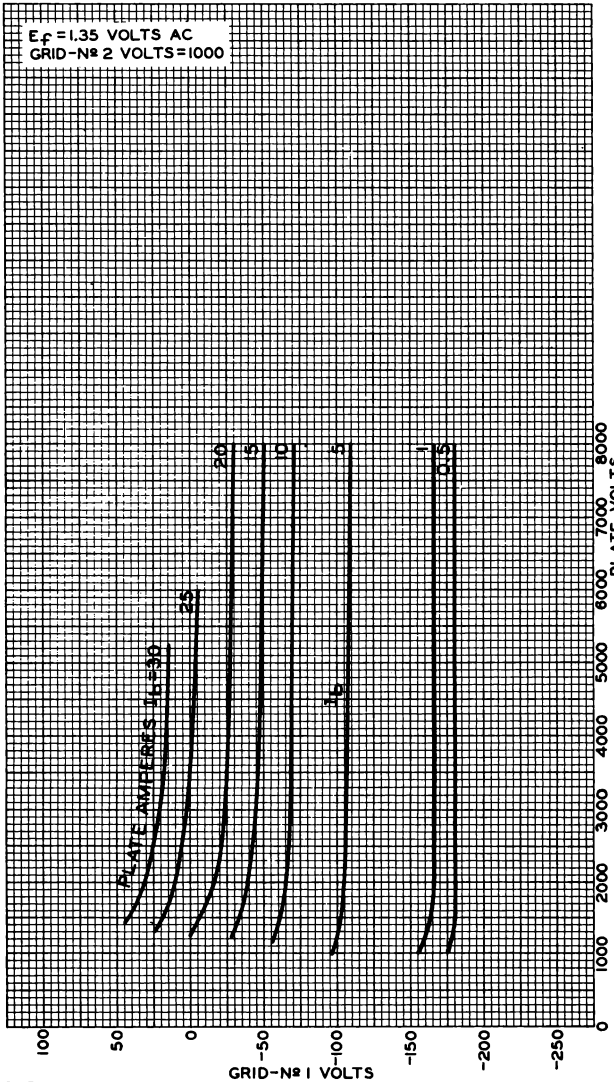
92CM-8252

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6448

6448

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



FEB. 24, 1954

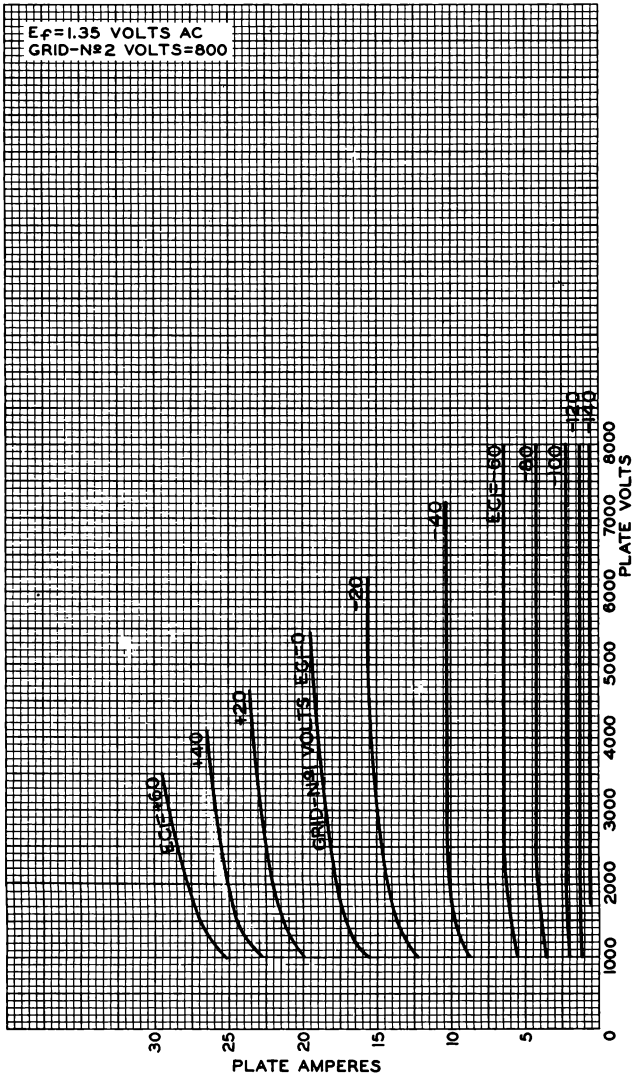
TUBE DIVISION

92CM-8255

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6448

AVERAGE PLATE CHARACTERISTICS



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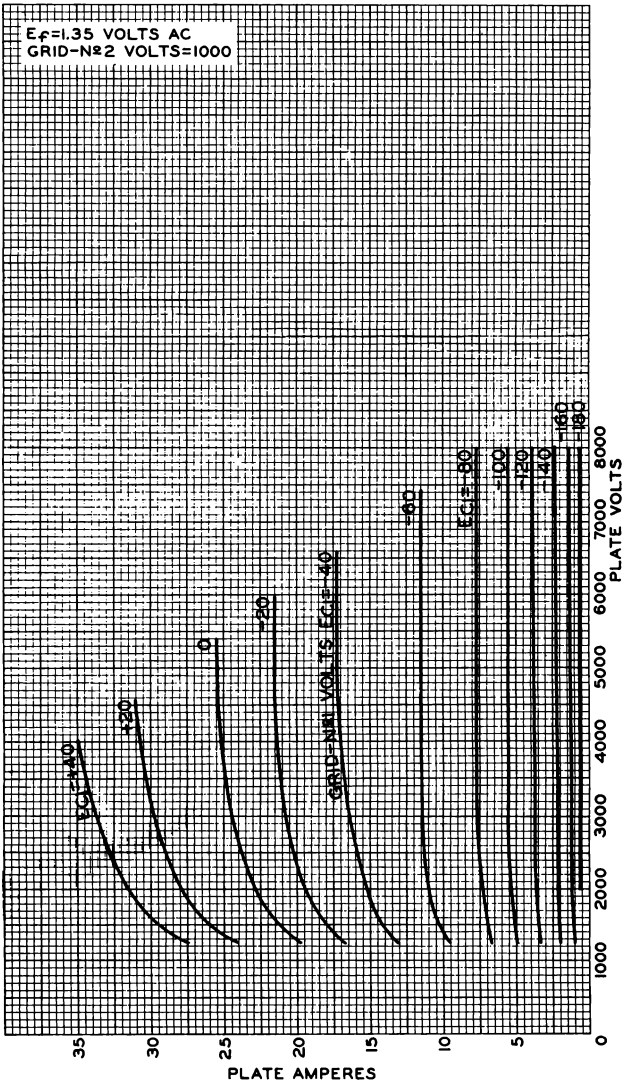
AVERAGE PLATE CHARACTERISTICS

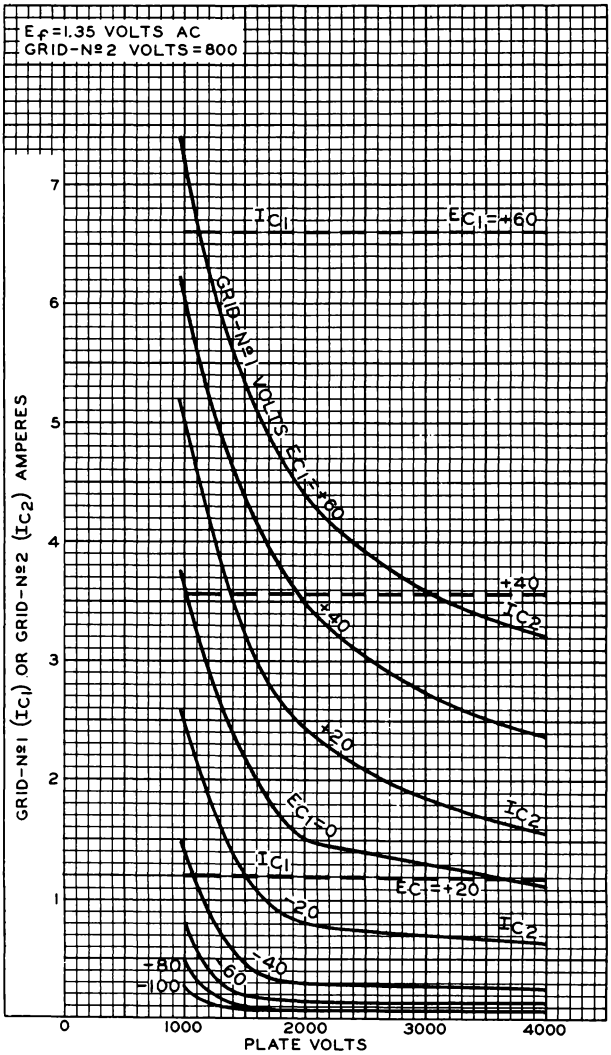


FEB.19,1954 TUBE DIVISION 92CM-8248

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6448

AVERAGE CHARACTERISTICS



6448

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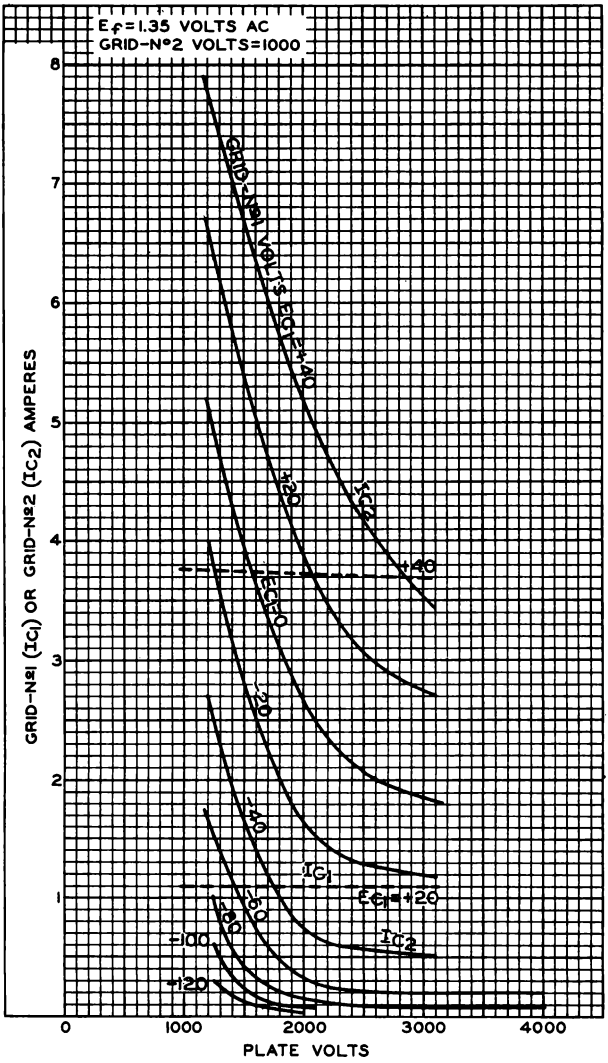
AVERAGE CHARACTERISTICS



FEB. 18, 1954

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8246

6524

TWIN BEAM POWER TUBE

Useful at frequencies up to 470 Mc

Unless Otherwise Specified, Values are on a Per-Tube Basis

GENERAL DATA

Electrical:

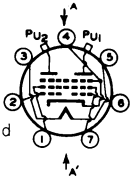
Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	1.25	amp
Transconductance▲ for dc plate volts = 200, dc grid-No.2 volts = 200, and dc plate ma. = 50	4500	μmhos
Mu-Factor, Grid No.2 to Grid No.1▲ for dc plate volts = 200, dc grid-No.2 volts = 200, and dc plate ma. = 50	8.5	
Direct Interelectrode Capacitances:▲*		
Grid No.1 to plate	0.11 max.	μμf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2 (pins 1 & 7), and heater	7	μμf
Plate to cathode & grid No.3 & internal shield, grid No.2 (pins 1 & 7), and heater	3.4	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	3-9/16"
Seated Length	3" ± 1/8"
Maximum Diameter	1-13/16"#
Bulb	T-14#
Bulb Terminals (Two)	See *Dimensional Outline*
Weight (Approx.)	3 oz
Base	Medium-Button Septar 7-Pin (JETEC No.E7-20)

BOTTOM VIEW

Pin 1 - Grid No.2
Pin 2 - Grid No.1 of Unit No.2
Pin 3 - Heater
Pin 4 - Cathode, Grid No.3, Internal Shield
Pin 5 - Heater



Pin 6 - Grid No.1 of Unit No.1
Pin 7 - Grid No.2
Pu_1 - Plate of Unit No.1
Pu_2 - Plate of Unit No.2

PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

Bulb Temperature (At hottest point)	210 max.	°C

Cooling: Free circulation of air around the tube is required. In addition, some forced-air cooling will generally be required to prevent exceeding the specified maximum bulb temperature.

▲ Each unit.

* With no external shield.

\# The 6524 may be made with a bulb as small as a T-12, but the equipment manufacturer must design for the specified maximum bulb diameter of 1-13/16".

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TWIN BEAM POWER TUBE

AF POWER AMPLIFIER & MODULATOR — Class AB_2†

	CCS°	*ICAS*°°	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	500 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	300 max.	300 max.	volts
DC GRID-No.2 SUPPLY VOLTAGE	400 max.	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT**	150 max.	150 max.	ma
MAX.-SIGNAL PLATE INPUT**	70 max.	85 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT**	3 max.	3 max.	watts
PLATE DISSIPATION**	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
Typical CCS Operation:			
DC Plate Voltage	400	500	volts
DC Grid-No.2 Voltage▲▲	200	200	volts
DC Grid-No.1 (Control-Grid) Voltage:			
From fixed-bias source	-23	-26	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	72	70	volts
DC Plate Current:			
Zero-signal value	25	20	ma
Max.-signal value	145	116	ma
DC Grid-No.2 Current:			
Zero-signal value	0.1	0.1	ma
Max.-signal value	10	10	ma
DC Grid-No.1 Current:			
Max.-signal value	2.4	2.6	ma
Effective Load Resistance (Plate to plate)	7100	11100	ohms
Max.-Signal Driving Power (Approx.)♦	0.1	0.1	watt
Max.-Signal Power Output (Approx.)	39	40	watts
Typical ICAS Operation:			
DC Plate Voltage	500	600	volts
DC Grid-No.2 Voltage▲▲	200	200	volts
DC Grid-No.1 (Control-Grid) Voltage:			
From fixed-bias source	-25	-26	volts

† Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

** Averaged over any audio-frequency cycle of sine-wave form.

°, °°, ▲▲, ♦: See next page.

TWIN BEAM POWER TUBE

Typical ICAS Operation (Cont'd):

Peak AF Grid-No.1-to-Grid-No.1 Voltage	76	76	volts
DC Plate Current:			
Zero-signal value	25	21	ma
Max.-Signal value	145	135	ma
DC Grid-No.2 Current:			
Zero-signal value	0.1	0.1	ma
Max.-signal value	10	13	ma
DC Grid-No.1 Current:			
Max.-signal value	2.9	3.3	ma
Effective Load Resistance (Plate to plate)	8900	11400	ohms
Max.-Signal Driving Power (Approx.)♦	0.1	0.1	watt
Max.-Signal Power Output (Approx.)	50	57	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance:♦

With fixed bias	30000 max.	ohms
With cathode bias	Not recommended	

PLATE-MODULATED PUSH-PULL RF POWER AMP. — Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

For max. plate voltage and max. plate input above 100 Mc, see Rating Chart I

	CCS°	*ICAS°°*	
DC PLATE VOLTAGE	400 max.	500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	300 max.	300 max.	volts
DC GRID-No.2 SUPPLY VOLTAGE	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	125 max.	125 max.	ma
DC GRID-No.1 CURRENT	4 max.	4 max.	ma
PLATE INPUT	45 max.	55 max.	watts
GRID-No.2 INPUT	2 max.	2 max.	watts
PLATE DISSIPATION	13.5 max.	16.7 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts

▲▲ Preferably obtained from a separate source or from the plate-voltage supply with a voltage divider.

♦ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the AB_2 stage. To minimize distortion, the effective resistance per grid-No.1 circuit of the AB_2 stage should be held at a low value. For this purpose, the use of transformer coupling is recommended. In no case, however, should the total dc grid-No.1-circuit resistance exceed 30000 ohms.

°,°°: See next page.

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TWIN BEAM POWER TUBE

	CCS°	ICAS°°	
Typical Operation up to 100 Mc:			
DC Plate Voltage	400	500	volts
DC Grid-No.2 Voltage (Approx.)♦	200	200	volts
From an adjustable series resistor having max. value of	45000	45000■	ohms
DC Grid-No.1 Voltage★.	-61	-61	volts
From combination employing grid resistor of	6200	6200	ohms
with fixed bias of	-45	-45	volts
DC Plate Current	100	100	ma
DC Grid-No.2 Current (Approx.)	7	7	ma
DC Grid-No.1 Current (Approx.)	2.5	2.5	ma
Driving Power (Approx.). . . .	0.2	0.2	watt
Power Output (Approx.)●. . . .	31	40	watts
Typical Operation at 462 Mc:			
DC Plate Voltage	300	300	volts
DC Grid-No.2 Voltage (Approx.)♦	200	240	volts
From an adjustable series resistor having max. value of	45000	25000	ohms
DC Grid-No.1 Voltage★.	-60	-60	volts
From combination employing grid resistor of	15000	15000	ohms
with fixed bias of	-45	-45	volts
DC Plate Current	75	95	ma
DC Grid-No.2 Current (Approx.)	4	5.5	ma
DC Grid-No.1 Current (Approx.)	1	1	ma
Driver Power Output (Approx.).	7	7	watts
Useful Power Output(Approx.)●●	9	12	watts
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance‡	30000 max.	30000 max.	ohms

PUSH-PULL RF POWER AMP. & OSCILLATOR--Class C Telegraphy□
and
PUSH-PULL RF POWER AMPLIFIER--Class C FM Telephony

Maximum Ratings, *Absolute Values*:	CCS°	ICAS°°	
For max. plate voltage and max. plate input above 100 Mc, see Rating Chart II			
DC PLATE VOLTAGE	500 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	300 max.	300 max.	volts

♦ obtained preferably from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor. It is recommended that this resistor be adjustable to permit obtaining the desired operating plate current after initial tuning adjustments are completed.

★ obtained from a combination of grid-No.1 resistor with either fixed supply or cathode resistor. The combination of grid-No.1 resistor and fixed supply has the advantage of not only protecting the tube from damage through loss of excitation but also of minimizing distortion by bias-supply compensation.

°, °°, ■, ●, ●●, ‡, □: See next page.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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TWIN BEAM POWER TUBE

	CCS°	ICAS°°	
DC GRID-No.2 SUPPLY VOLTAGE . .	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	150 max.	150 max.	ma
DC GRID-No.1 CURRENT	4 max.	4 max.	ma
PLATE INPUT	70 max.	85 max.	watts
GRID-No.2 INPUT	3 max.	3 max.	watts
PLATE DISSIPATION	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
Typical Operation up to 100 Mc:			
DC Plate Voltage	500	600	volts
DC Grid-No.2 Voltage (Approx.)⊕.	200	200	volts
From an adjustable series resistor having max. value of . .	40000⊿	40000⊿	ohms
DC Grid-No.1 Voltage■.	-44	-44	volts
From grid resistor of	12000	12000	ohms
From cathode resistor of . . .	330	330	ohms
DC Plate Current	120	120	ma
DC Grid-No.2 Current (Approx.) .	8	8	ma
DC Grid-No.1 Current (Approx.) .	3.7	3.7	ma
Driving Power (Approx.)	0.2	0.2	watt
Power Output (Approx.)⊕⊕	46	56	watts
Typical Operation as Amplifier at 462 Mc:◆			
DC Plate Voltage	300	300	volts
DC Grid-No.2 Voltage (Approx.)⊕.	200	250	volts
From an adjustable series resistor having max. value of .	60000	20000	ohms
DC Grid-No.1 Voltage■	-31	-38	volts
From grid resistor of	12000	12000	ohms
From cathode resistor of . . .	240	240	ohms
DC Plate Current	120	150	ma
DC Grid-No.2 Current (Approx.) .	3	6	ma
DC Grid-No.1 Current (Approx.) .	2.6	3.2	ma

⊕ At 100 Mc, useful power output measured at load of output circuit is approximately 29 watts CCS and 36 watts ICAS.

□ Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

⊿ Connected to a 400-volt tap on suitable voltage divider across the plate-supply voltage.

⊕⊕ At 100 Mc, useful power output measured at load of output circuit is approximately 43 watts CCS and 52 watts ICAS.

◆ Typical operation as an oscillator at 462 Mc is the same as that shown for amplifier service except that the useful power output measured at load of output circuit is approximately 9 watts CCS and 13 watts ICAS.

°, °°, ‡, ⊕⊕, ⊕, ■: See next page.

6524

TWIN BEAM POWER TUBE

	CCS°	ICAS°°	
Driver Power Output (Approx.) . .	7	7	watts
Useful Power Output (Approx.)●●.	16	20	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance‡. .	30000	30000 max.	ohms

FREQUENCY TRIPLER — Class C

	CCS°	ICAS°°	
Maximum Ratings, *Absolute Values:*			
For max. plate voltage and max. plate input above 100 Mc, see Rating Chart III			
DC PLATE VOLTAGE	400 max.	400 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE .	300 max.	300 max.	volts
DC GRID-No.2 SUPPLY VOLTAGE . .	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	100 max.	115 max.	ma
DC GRID-No.1 CURRENT	4 max.	4 max.	ma
PLATE INPUT	36 max.	45 max.	watts
GRID-No.2 INPUT	3 max.	3 max.	watts
PLATE DISSIPATION	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
Typical Operation as Tripler to 462 Mc:			
DC Plate Voltage	300	300	volts
DC Grid-No.2 Voltage (Approx.)●.	220	250	volts
From an adjustable series resistor having max. value of .	30000	20000	ohms
DC Grid-No.1 Voltage■.	-148	-148	volts
From grid resistor of	51000	51000	ohms
DC Plate Current	90	110	ma
DC Grid-No.2 Current (Approx.) .	5	6.5	ma
DC Grid-No.1 Current (Approx.)	2.9	2.9	ma

‡ When grid No.1 is driven positive, the total dc grid-No.1-circuit resistance should not exceed the specified value of 30000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply.

● Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should be used only when the 6524 is used in a circuit which is not keyed. It is recommended that this resistor be adjustable to permit obtaining the desired operating plate current after initial tuning adjustments are completed. Grid-No.2 voltage must not exceed 400 volts under key-up conditions.

■ Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

°, °°, ●●: See next page.

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TWIN BEAM POWER TUBE

	CCS°	ICAS°°	
Driver Power Output (Approx.) .	4	4	watts
Useful Power Output (Approx.)●●.	7	8.5	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance‡‡ .	60000 max.	60000 max.	ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	1.175	1.325	amp
Mu-Factor, Grid No.2 to Grid No.1 (Each Unit) . . .	1,2	7.5	9.5	
Direct Interelectrode Capacitances (Each Unit):				
Grid No.1 to plate	3	-	0.11	μμf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2 (pins 1 & 7), and heater	3	5.8	8.2	μμf
Plate to cathode & grid No.3 & internal shield, grid No.2 (pins 1 & 7), and heater	3	2.6	4.2	μμf

Note 1: With 6.3 volts ac on heater.

Note 2: With dc plate voltage of 200 volts, dc grid-No.2 voltage of 200 volts, and dc plate current of 50 ma.

Note 3: With no external shield.

° Continuous Commercial Service.

°° Intermittent Commercial and Amateur Service.

●● This value of useful power is measured at load of output circuit.

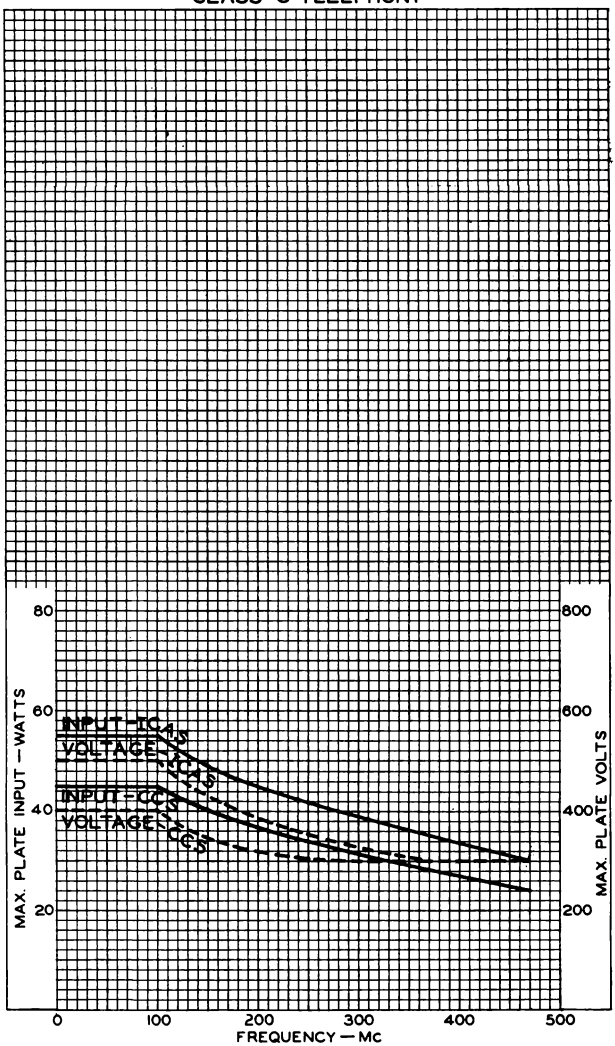
‡‡ When grid No.1 is driven positive, the total dc grid-No.1-circuit resistance should not exceed the specified value of 60000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply.

OPERATING CONSIDERATIONS

Shielding of the 6524 in rf service is required for stable operation. A convenient method of shielding is to mount the socket approximately 5/8" beneath a hole in the chassis plate so that when the 6524 is inserted in the socket, the internal shield (see *Dimensional Outline)* of the tube will be close to the edge of the hole and in the same plane as the chassis plate. This arrangement provides an effective shield to isolate the grid-No.1 circuits from the plate circuits.

6524

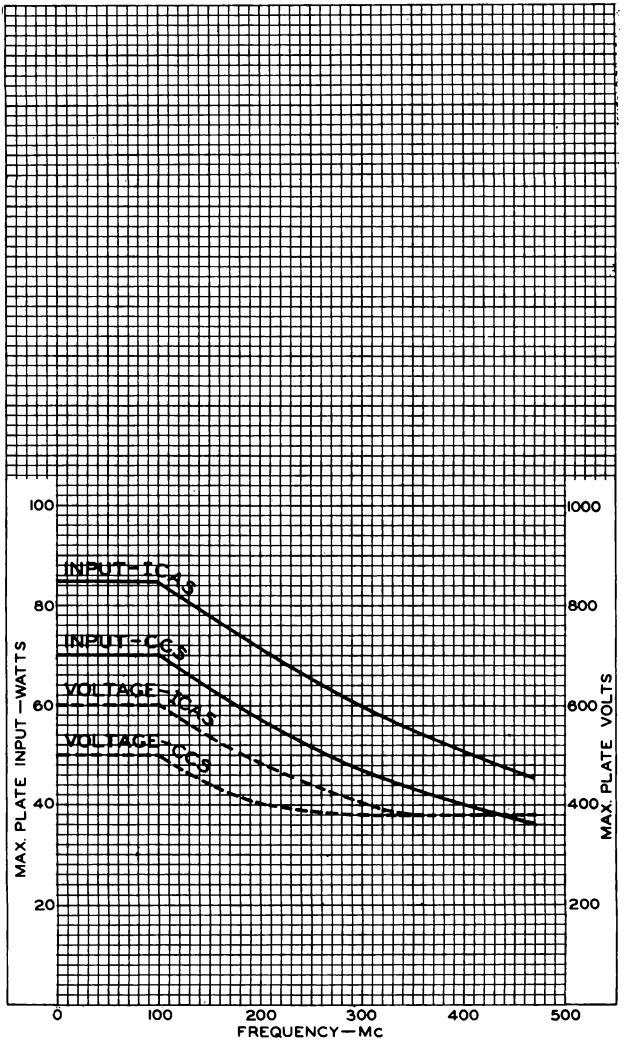
RATING CHART I
CLASS C TELEPHONY



6524

RATING CHART II

CLASS C TELEGRAPHY

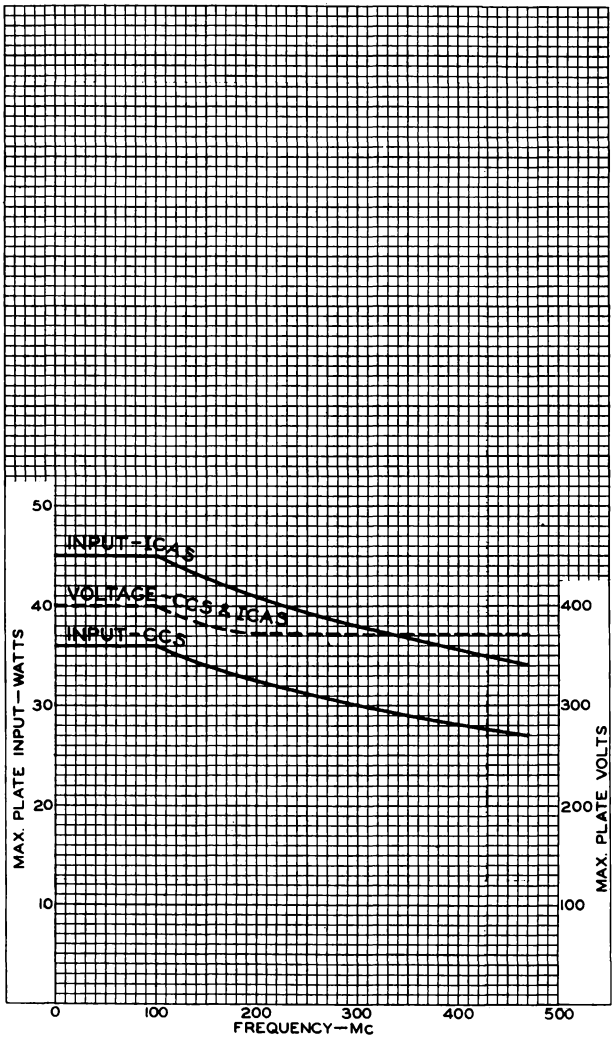


JULY 13, 1954

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8348

6524
RATING CHART III
CLASS C TRIPLER



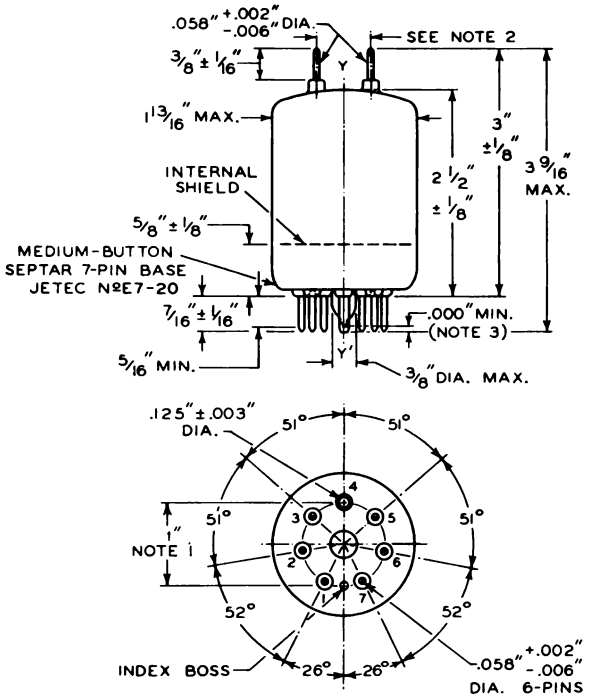
JULY 13, 1954

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8349

6524

TWIN BEAM POWER TUBE



THE REFERENCE AXIS YY' IS DEFINED AS THE AXIS OF THE BASE-PIN GAUGE DESCRIBED IN NOTE 1.

For Notes, see next page.

6524

TWIN BEAM POWER TUBE

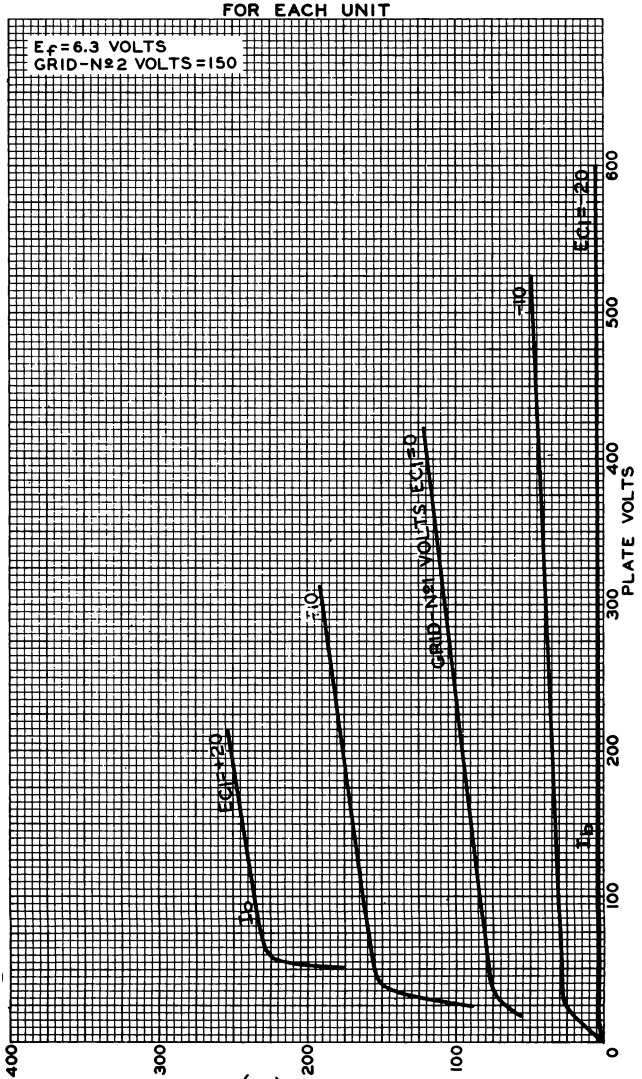
NOTE 1: ANGULAR VARIATIONS BETWEEN PINS AND VARIATION IN PIN-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT PINS WILL ENTER TO A DISTANCE OF 0.375" A FLAT-PLATE BASE-PIN GAUGE HAVING SIX HOLES 0.0800" ± 0.0005" AND ONE HOLE 0.1450" ± 0.0005" ARRANGED ON A 1.0000" ± 0.0005" CIRCLE AT SPECIFIED ANGLES WITH TOLERANCE OF ± 5' FOR EACH ANGLE. GAUGE IS ALSO PROVIDED WITH A HOLE 0.500" ± 0.010" CONCENTRIC WITH PIN CIRCLE WHOSE CENTER IS ON THE AXIS YY'.

NOTE 2: THE PLATE LEADS WILL ENTER A FLAT-PLATE PLATE-LEAD GAUGE HAVING MINIMUM THICKNESS OF 0.375" AND HAVING TWO HOLES 0.1200" ± 0.0005" WHOSE CENTERS ARE LOCATED AT A DISTANCE OF 0.343" ± 0.001" FROM THE AXIS YY' AND WHOSE AXES ARE PARALLEL TO YY'. THE PLANE THROUGH THESE AXES WILL BE 90° ± 5' FROM THE PLANE THROUGH YY' AND PIN No.4.

NOTE 3: EXHAUST TIP WILL NOT EXTEND BEYOND THE PLANE WHICH PASSES THROUGH THE ENDS OF THE THREE LONGEST PINS.

6524

AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



JULY 15, 1954

TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

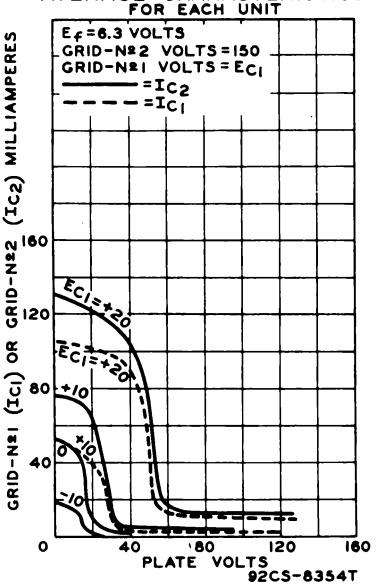
92CM-8350

6524

6524

CHARACTERISTICS CURVES

AVERAGE CHARACTERISTICS
FOR EACH UNIT



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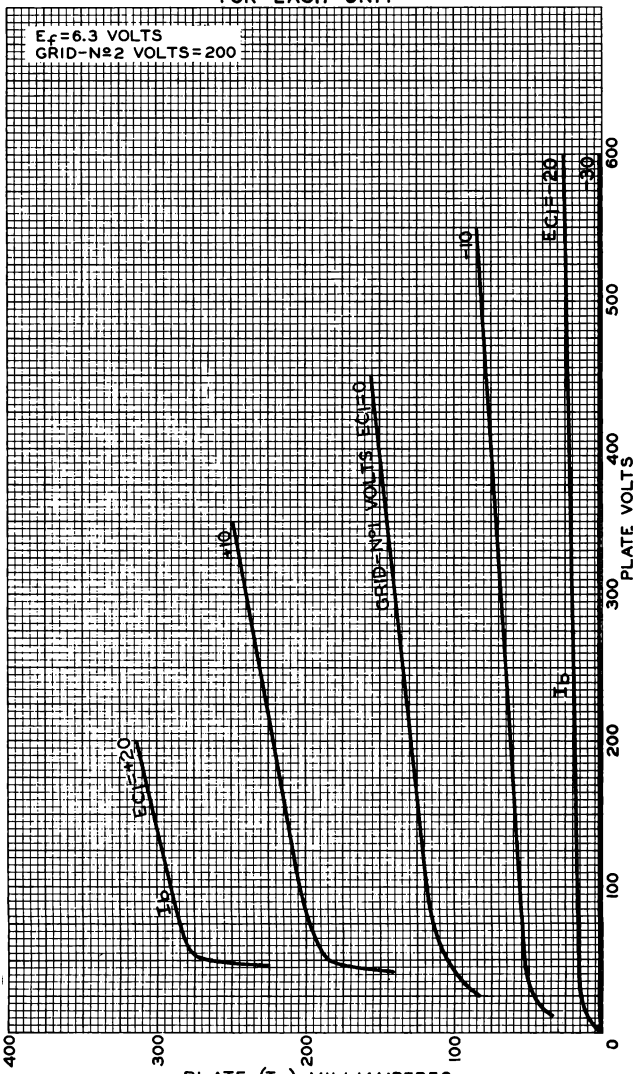
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



JULY 12, 1954

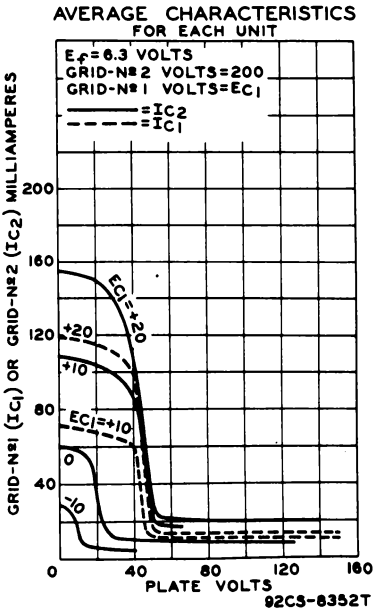
TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8346

6524

CHARACTERISTICS CURVES

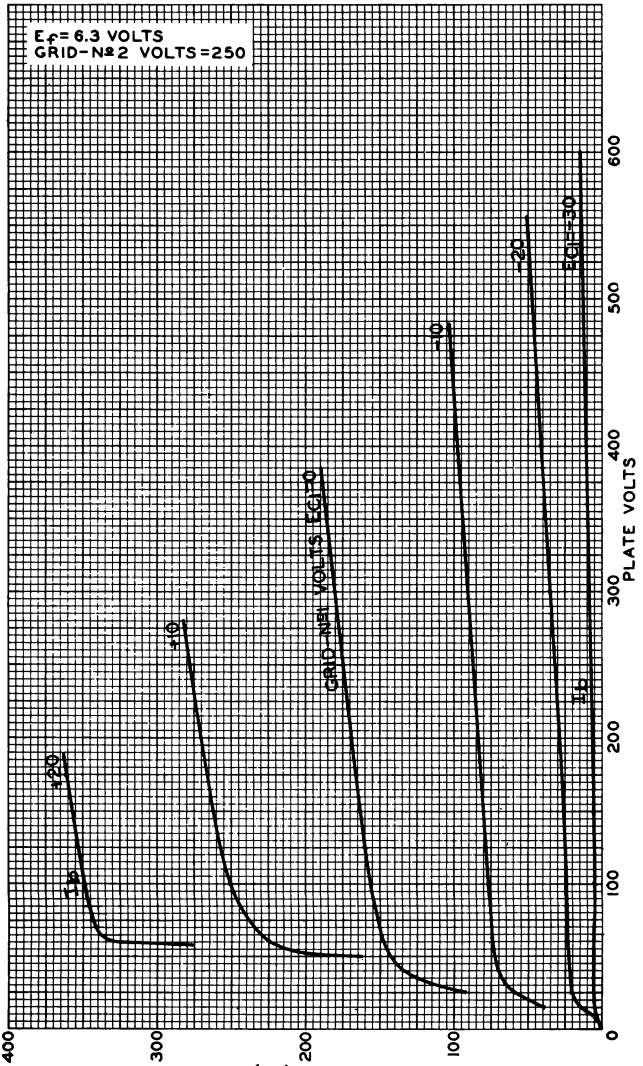


TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6524

6524

AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



JULY 15, 1954

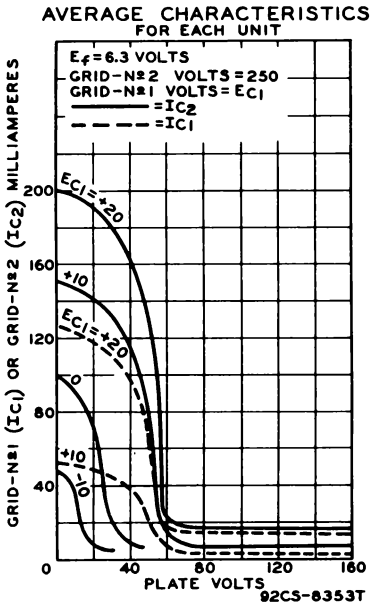
TUBE DIVISION

92CM-8351

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6524

CHARACTERISTICS CURVES



TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6893

BEAM POWER TUBE

Useful with full input up to 125 Mc and with reduced input up to 175 Mc

The 6893 is identical with the 2E26 except for the following items, but otherwise has the same technical data exclusive of IMS conditions:

Heater, for Unipotential Cathode:
Voltage. . . . . 12.6 ± 10% . . . . ac or dc volts
Current. . . . . 0.4 . . . . . .amp

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.37	0.43	amp

Note 1: With 12.6 volts ac on heater.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

8000
TRANSMITTING TRIODE

GENERAL DATA

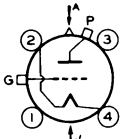
Electrical:

Filament, Thoriated Tungsten:		
Voltage	10	ac or dc volts
Current	4.5	amp
Amplification Factor	16.5	
Direct Interelectrode Capacitances:		
Grid to Plate	6.4	μμf
Grid to Filament	5.0	μμf
Plate to Filament	3.3	μμf

Mechanical:

Mounting Position	Vertical, base down; or Horizontal, pins 1 & 2 in vertical plane
Overall Length	8-1/2" ± 1/4"
Seated Length	8-3/16" ± 1/4"
Maximum Radius	2-1/8" ± 1/8"
Bulb	T-20
Cap (top)	Skirted Medium
Cap (side)	Medium
Base	Medium Metal-Shell Jumbo 4-Pin, Bayonet
Basing Designation for BOTTOM VIEW	20_1

Pin 1 - No Connection
Pin 2 - Filament
Pin 3 - No Connection



AA'=PLANE OF ELECTRODES

Pin 4 - Filament
P - Plate (End Cap)
G - Grid (Side Cap)

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum Ratings, ***Absolute Values:***

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	2500 max.	2750 max.	volts
MAX.-SIGNAL DC PLATE CUR.*	250 max.	250 max.	ma.
MAX.-SIGNAL PLATE INPUT*	425 max.	510 max.	watts
PLATE DISSIPATION*	125 max.	175 max.	watts ←

Typical Operation:

Unless otherwise specified, values are for 2 tubes

DC Plate Voltage	2000	2250	volts
DC Grid Voltage	-120	-130	volts
Peak AF Grid-to-Grid Voltage	520	560	volts
Zero-Signal DC Plate Current	60	65	ma.
Max.-Signal DC Plate Current	425	450	ma.
Effective Load Resistance (plate-to-plate)	10800	12000	ohms

*, ●, ●●: See next page. ← Indicates a change.

8000
TRANSMITTING TRIODE

Max.-Signal Driving Power (Approx.) . . .	6.5 . .	7.9 . .	watts
Max.-Signal Power Output (Approx.) . . .	600 . .	725 . .	watts

* Averaged over any audio-frequency cycle of sine-wave form.

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	*ICAS*●●	
→ DC PLATE VOLTAGE	2000 max.	2500 max.	volts
DC PLATE CURRENT	185 max.	185 max.	ma.
PLATE INPUT.	190 max.	225 max.	watts
→ PLATE DISSIPATION.	125 max.	175 max.	watts

Typical Operation:

DC Plate Voltage	2000 . .	2500 . .	volts
DC Grid Voltage.	-130 . .	-145 . .	volts
Peak RF Grid Voltage	140 . .	150 . .	volts
DC Plate Current	95 . .	100 . .	ma.
→ DC Grid Current (Approx.)□ .	0.5 . .	0 . .	ma.
Driving Power (Approx.)□▲	4.8 . .	5.4 . .	watts
Power Output (Approx.) . . .	65 . .	75 . .	watts

GRID-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	*ICAS*●●	
→ DC PLATE VOLTAGE	2000 max.	2500 max.	volts
DC GRID VOLTAGE.	-500 max.	-500 max.	volts
DC PLATE CURRENT	185 max.	185 max.	ma.
PLATE INPUT.	190 max.	225 max.	watts
→ PLATE DISSIPATION.	125 max.	175 max.	watts

Typical Operation:

DC Plate Voltage	2000 . .	2250 . .	volts
DC Grid Voltage.	-250 . .	-265 . .	volts
Peak RF Grid Voltage	265 . .	270 . .	volts
Peak AF Grid Voltage	120 . .	115 . .	volts
DC Plate Current	95 . .	100 . .	ma.
DC Grid Current (Approx.)□ .	0 . .	0 . .	ma.
Driving Power (Approx.)□▲. .	4.3 . .	2.5 . .	watts
Power Output	65 . .	75 . .	watts

▲ At crest of audio-frequency cycle with modulation factor of 1.0.
●, ●●, □ : See next page. ← Indicates a change.

8000
TRANSMITTING TRIODE

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

	CCS●	ICAS●●	
DC PLATE VOLTAGE	1600 max.	2000 max.	volts ←
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT	210 max.	250 max.	ma.
DC GRID CURRENT	40 max.	45 max.	ma. ←
PLATE INPUT	335 max.	500 max.	watts ←
PLATE DISSIPATION	85 max.	125 max.	watts

Typical Operation: ←

DC Plate Voltage	1600	2000	volts
DC Grid Voltage⊕	-300	-370	volts
	15000	10000	ohms
Peak RF Grid Voltage	470	630	volts
DC Plate Current	210	250	ma.
DC Grid Current (Approx.)□	20	37	ma.
Driving Power (Approx.)□	8.5	20	watts
Power Output (Approx.)	250	380	watts

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum Ratings, ***Absolute Values:*** ←

	CCS●	ICAS●●	
DC PLATE VOLTAGE	2000 max.	2500 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT	250 max.	300 max.	ma.
DC GRID CURRENT	40 max.	45 max.	ma.
PLATE INPUT	500 max.	750 max.	watts
PLATE DISSIPATION	125 max.	175 max.	watts

Typical Operation: ←

DC Plate Voltage	2000	2500	volts
DC Grid Voltage▲▲	-195	-240	volts
	8100	6000	ohms
	710	700	ohms
Peak RF Grid Voltage	370	480	volts
DC Plate Current	250	300	ma.
DC Grid Current (Approx.)	24	40	ma.
Driving Power (Approx.)	8	18	watts
Power Output (Approx.)	375	575	watts

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

⊕ Obtained by grid resistor of value shown or by combination methods.

□, □□, ▲▲: See next page. ← Indicates a change.

8000
TRANSMITTING TRIODE

□ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

▲▲ obtained from fixed supply, by grid resistor (8100,6000) or by cathode resistor (710,700).

NOTE: When the 8000 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed-bias must be used to maintain the plate current at a safe value. With a plate voltage of 2500 volts a fixed bias of at least -140 volts should be used.

CLASS C OSCILLATOR

Operation with Unfiltered Plate Supply

Maximum Ratings, ***Absolute Values:***

	Supply 1⊕		*Supply 2*♣		
RMS PLATE VOLTAGE.	2500	max.	–	–	volts
DC PLATE VOLTAGE	–	–	1800	max.	volts
DC GRID VOLTAGE.	-200	max.	-300	max.	volts
DC PLATE CURRENT	160	max.	225	max.	ma.
DC GRID CURRENT.	25	max.	35	max.	ma.
PLATE INPUT.	450	max.	500	max.	watts
PLATE DISSIPATION.	125	max.	125	max.	watts

Typical Operation in Push-Pull Circuit at 30 Mc.:

Unless otherwise specified, values are for 2 tubes

RMS Plate Voltage.	2500	. .	–	. .	volts
DC Plate Voltage	–	. .	1800	. .	volts
Grid Resistor.	3500	. .	5000	. .	ohms
DC Plate Current	320	. .	450	. .	ma.
DC Grid Current.	30	. .	35	. .	ma.
Power Output (Approx.) . . .	650	. .	700	. .	watts
Circuit Power Output (Approx.)- 85% circuit efficiency . .	550	. .	600	. .	watts

⊕ Self-rectified ac supply.

♣ Separate rectified (no filter) single-phase, full-wave plate supply.

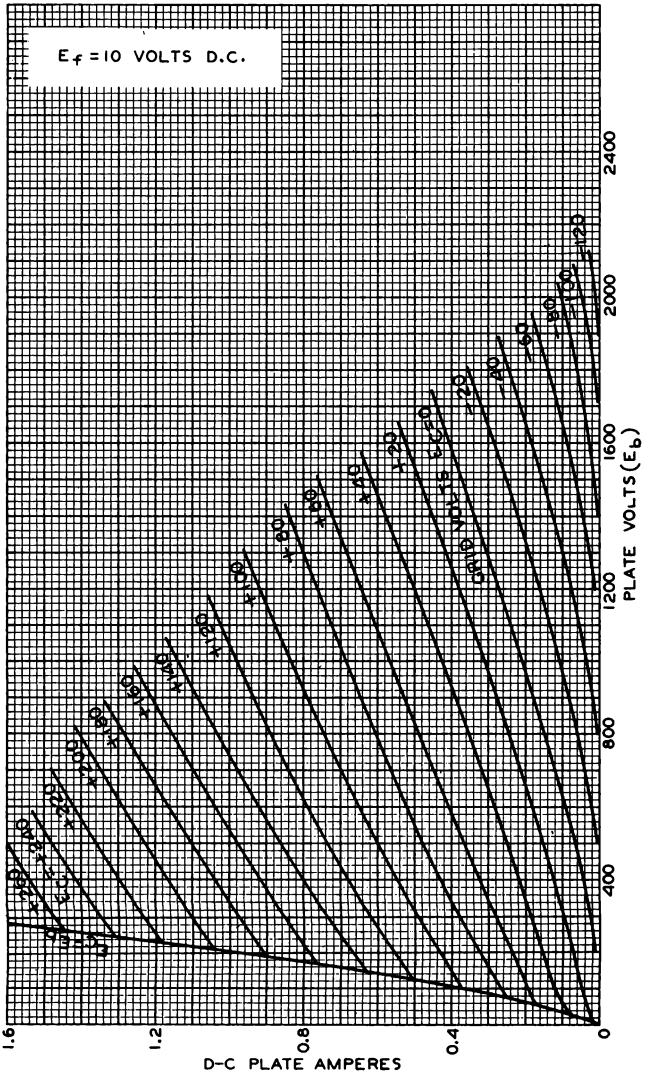
For applications where grid current and grid voltage may vary widely because of fluctuating loads, It is important to design equipment so that the maximum grid-current and grid-voltage ratings are never exceeded for any load. An approximate rule is to adjust the grid-current and grid-voltage values at full-load to one-half of the corresponding maximum values. This operating condition permits grid-current and grid voltage values to rise for zero-load to twice their full-load values, and usually provides adequate leeway.

Data on operating frequencies for the 8000 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

OUTLINE DIMENSIONS for the 8000 are the same as those for the 810

8000

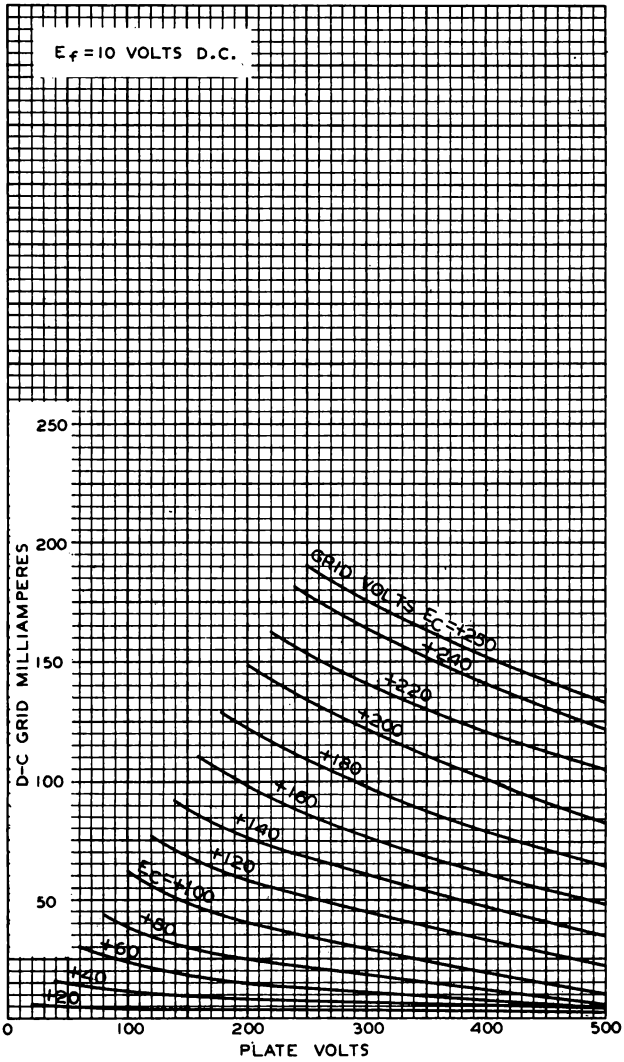
AVERAGE PLATE CHARACTERISTICS



8000

8000

TYPICAL CHARACTERISTICS



FEB. 12, 1941

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6213

8003

OSCILLATOR, POWER AMPLIFIER, MODULATOR

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Amplification Factor	12	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	11.7	μμf
Grid to Filament	5.8	μμf
Plate to Filament	3.4	μμf
Maximum Overall Length		8-1/2"
Maximum Diameter		2-9/16"
Bulb		T-20
Cap		Medium Metal
Base		Jumbo 4-Large Pin

MAXIMUM CCS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

A-F POWER AMPLIFIER & MODULATOR - Class B

	CCS	
D-C Plate Voltage	1350 max.	volts
Max.-Signal D-C Plate Current*	250 max.	ma.
Max.-Signal Plate Input*	330 max.	watts
Plate Dissipation*	100 max.	watts
Typical Operation:		
Unless otherwise specified, values are for 2 tubes		
D-C Plate Voltage	1350	volts
D-C Grid Voltage#	-100	volts
Peak A-F Grid-to-Grid Voltage	480	volts
Zero-Sig. D-C Plate Current	40	ma.
Max.-Sig. D-C Plate Current	490	ma.
Load Resistance (per tube)	1500	ohms
Effective Load Resistance (plate to plate)	6000	ohms
Max.-Sig. Driving Power	10.5 approx.	watts
Max.-Sig. Power Output	460 approx.	watts

* Averaged over any audio-frequency cycle of sine-wave form.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS	
D-C Plate Voltage	1350 max.	volts
D-C Plate Current	150 max.	ma.
Plate Input	150 max.	watts
Plate Dissipation	100 max.	watts
Typical Operation:		
D-C Plate Voltage	1350	volts
D-C Grid Voltage#	-110	volts
Peak R-F Grid Voltage	135	volts
D-C Plate Current	110	ma.
D-C Grid Current**	1.5 approx.	ma.
Driving Power** °	8 approx.	watts
Power Output	50 approx.	watts

° At crest of audio-frequency cycle with modulation factor of 1.0.
\# With a-c filament supply.
**: See end of tabulation.

8003

OSCILLATOR, POWER AMPLIFIER, MODULATOR

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS		
D-C Plate Voltage	1100	max.	volts
D-C Grid Voltage	-400	max.	volts
D-C Plate Current	200	max.	ma.
D-C Grid Current	50	max.	ma.
Plate Input	220	max.	watts
Plate Dissipation	67	max.	watts
Typical Operation:			
D-C Plate Voltage	1100		volts
D-C Grid Voltage△	-260		volts
	6500		ohms
Peak R-F Grid Voltage	430		volts
D-C Plate Current	200		ma.
D-C Grid Current**	40	approx.	ma.
Driving Power**	15	approx.	watts
Power Output	167	approx.	watts

△ obtained from grid resistor of value shown or by combination methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

	CCS		
D-C Plate Voltage	1350	max.	volts
D-C Grid Voltage	-400	max.	volts
D-C Plate Current	250	max.	ma.
D-C Grid Current	50	max.	ma.
Plate Input	330	max.	watts
Plate Dissipation	100	max.	watts
Typical Operation:			
D-C Plate Voltage	1350		volts
D-C Grid Voltage◊	-175		volts ←
	5000		ohms
	625		ohms ←
Peak R-F Grid Voltage	350		volts
D-C Plate Current	245		ma.
D-C Grid Current**	35	approx.	ma.
Driving Power**	11	approx.	watts
Power Output	250	approx.	watts

◊ Obtained from fixed supply, by grid resistor (5000) or by cathode resistor (630).

NOTE: When the 8003 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With plate voltage of 1350 volts, a fixed bias at least -85 volts should be used.

**, ##: See end of tabulation. ← Indicates a change.

OSCILLATOR, POWER AMPLIFIER, MODULATOR

(continued from preceding page)

OSCILLATOR - OPERATION WITH UNFILTERED PLATE SUPPLY

	Supply 1	*Supply 2*	
Plate Voltage	1500 max.	1200 max.	volts
D-C Grid Voltage	-200 max.	-250 max.	volts
D-C Plate Current	200 max.	225 max.	ma.
D-C Grid Current	30 max.	45 max.	ma.
Plate Input	330 max.	330 max.	watts
Plate Dissipation	100 max.	100 max.	watts

Typical Operation in push-pull circuit at 25 Mc:

Unless otherwise specified, values are for 2 tubes

Plate Voltage	1500 (RMS)	1200	volts
Grid Resistor	2000	3000	ohms
D-C Plate Current	400	450	ma.
D-C Grid Current	35	45	ma.
Power Output	500	450 approx.	watts
Circuit Power Output (85% circuit efficiency)	425	380 approx.	watts

1 Self-rectified a-c supply. (Plate voltages are RMS values.)

2 Separate rectified (no filter) single-phase, full-wave plate supply.

For applications where grid current and grid voltage may vary widely because of fluctuating loads. It is important to design equipment so that the maximum grid-current and grid-voltage ratings are never exceeded for any load. An approximate rule is to adjust the grid-current and grid-voltage values at full-load to one-half of the corresponding maximum values. This operating condition permits grid-current and grid voltage values to rise for zero-load to twice their full-load values, and usually provides adequate leeway.

Data on operating frequencies for the 8003 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

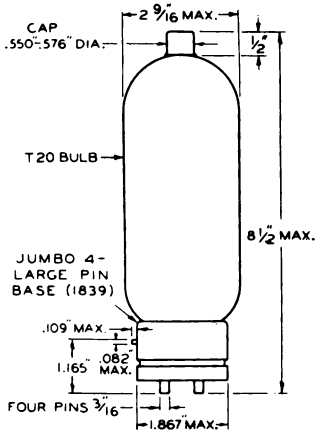
CURVES for the 8003 are the same as those for Type 211.

◄-Indicates a change.

8003

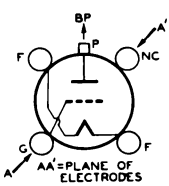
8003

OSCILLATOR, POWER AMPLIFIER, MODULATOR



BOTTOM VIEW OF BASE

92C-6203



F - Filament
G - Grid
P - Plate
NC - No Connection
BP - Bayonet Pin

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: With plane of electrodes vertical (on edge).

8005
POWER TRIODE

GENERAL DATA

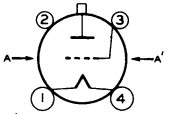
Electrical:

Filament, Thoriated Tungsten:		
Voltage (AC or DC)	10 ± 0.5	volts
Current, with 10 volts on filament . .	3.25	amp
Amplification Factor	20	
Direct Interelectrode Capacitances:		
Grid to Plate.	5	μμf
Grid to Filament	6.4	μμf
Plate to Filament.	1	μμf

Mechanical:

Mounting Position. . . .	Vertical, Base down; or Horizontal, with pins 2 and 3 in vertical plane
Overall Length	6-7/16" ± 1/4"
Seated Length.	5-7/8" ± 1/4"
Diameter	2-7/16"
Bulb	ST-19
Cap.	Medium, with Insulating Collar
Base	Medium-Metal-Shell Small 4-Pin, Bayonet
Basing Designation for BOTTOM VIEW	3G

Pin 1 - Filament
Pin 2 - No Connection



AA'=PLANE OF ELECTRODES

Pin 3 - Grid
Pin 4 - Filament
Cap - Plate

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum Ratings, ***Absolute Values*:**

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*.	200 max.	200 max.	ma
MAX.-SIGNAL PLATE INPUT* . . .	225 max.	250 max.	watts
PLATE DISSIPATION*	75 max.	85 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1250	1500	volts
DC Grid Voltage#	-55	-67.5	volts ←
Peak AF Grid-to-Grid Voltage .	290	330	volts ←
Zero-Signal DC Plate Current .	40	40	ma
Max.-Signal DC Plate Current .	320	330	ma ←
Effective Load Resistance (plate-to-plate). . .	8000	9800	ohms
Max.-Signal Driving Power (Approx.). . .	4	5.5	watts ←
Max.-Signal Power Output (Approx.). . .	250	330	watts ←

* Averaged over any audio-frequency cycle of sine-wave form.
●, ●●, #: See next page. ← Indicates a change.

8005
POWER TRIODE

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
DC PLATE CURRENT	100 max.	100 max.	ma
PLATE INPUT	110 max.	125 max.	watts
PLATE DISSIPATION	75 max.	85 max.	watts

Typical Operation:

DC Plate Voltage	1250	1500	volts
DC Grid Voltage#	-65	-80	volts
Peak RF Grid Voltage	85	90	volts
DC Plate Current	85	83	ma
DC Grid Current (Approx.)	2	1	ma
Driving Power (Approx.)♠	5.5	5	watts
Power Output (Approx.)	40	45	watts

♠ At crest of audio-frequency cycle with modulation factor of 1.0.

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	1000 max.	1250 max.	volts
DC GRID VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	160 max.	200 max.	ma
DC GRID CURRENT	45 max.	45 max.	ma
PLATE INPUT	160 max.	240 max.	watts
PLATE DISSIPATION	50 max.	75 max.	watts

Typical Operation:

DC Plate Voltage	1000	1250	volts
DC Grid Voltage●	-195	-195	volts
	7000	7000	ohms
Peak RF Grid Voltage	350	350	volts
DC Plate Current	160	190	ma
DC Grid Current (Approx.)	28	28	ma
Driving Power (Approx.)	9	9	watts
Power Output (Approx.)	115	170	watts

●,●●,#,●: See next page.

8005
POWER TRIODE

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum Ratings, ***Absolute Values:***

	CCS●	*ICAS●●*	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
DC GRID VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	200 max.	200 max.	ma
DC GRID CURRENT	45 max.	45 max.	ma
PLATE INPUT	240 max.	300 max.	watts
PLATE DISSIPATION	75 max.	85 max.	watts

Typical Operation:

DC Plate Voltage	1250	1500	volts
DC Grid Voltage▲▲	-115	-130	volts
	3800	4000	ohms
	520	560	ohms
Peak RF Grid Voltage	240	255	volts
DC Plate Current	190	200	ma
DC Grid Current (Approx.)	30	32	ma
Driving Power (Approx.)	6.5	7.5	watts
Power Output (Approx.)	170	220	watts

SELF-RECTIFYING OSCILLATOR or AMPLIFIER - Class C

Maximum Ratings, ***Absolute Values:***

	CCS●	
AC PLATE VOLTAGE (RMS)	1750 max.	volts
DC GRID VOLTAGE	-125 max.	volts
DC PLATE CURRENT	125 max.	ma
DC GRID CURRENT	25 max.	ma
PLATE INPUT	240 max.	watts
PLATE DISSIPATION	75 max.	watts

Typical Operation in Push-Pull Circuit at 50 Mc:

Values are for 2 tubes

AC Plate Voltage (RMS)	1750	volts
Grid Resistor●	2000	ohms
DC Plate Current	250	ma
DC Grid Current (at full load)	35	ma
Power Output (Approx.)	330	watts
Useful Power Output (Approx.)- 75% circuit efficiency	250	watts

●,●●,#,⊕,□□,▲▲,●: See next page.

8005
POWER TRIODE

AMPLIFIER or OSCILLATOR - Class C

With Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply

Maximum Ratings, ***Absolute Values:***

	CCS●	
DC PLATE VOLTAGE	1125 max.	volts
DC GRID VOLTAGE	-125 max.	volts
DC PLATE CURRENT	180 max.	ma
DC GRID CURRENT	40 max.	ma
PLATE INPUT	240 max.	watts
PLATE DISSIPATION	75 max.	watts

Typical Operation in Push-Pull Circuit at 27 Mc:

Values are for 2 tubes

DC Plate Voltage	1100	volts
Grid Resistor●	2000	ohms
DC Plate Current	360	ma
DC Grid Current	40	ma
Power Output (Approx.)	330	watts
Circuit Power Output (Approx.)- 85% circuit efficiency	280	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	3.1	3.4	amp
Amplification Factor	1,2	18	22	
Grid-Plate Capacitance	-	4.3	5.7	μμf
Grid-Filament Capacitance	-	5.3	7.5	μμf
Plate-Filament Capacitance	-	0.75	1.25	μμf
Grid Current	1,3	-	98	ma
Plate Current	1,4	30	70	ma
→ Useful Power Output	1,5	195	-	watts

Note 1: DC filament voltage = 10 volts.

Note 2: With dc grid voltage of -50 volts and plate voltage adjusted to give plate current of 50 ma.

Note 3: With dc plate voltage of 200 volts and dc grid voltage of +100 volts.

Note 4: With dc plate voltage of 1500 volts and dc grid voltage of -55 volts.

Note 5: With dc plate voltage of 1500 volts, plate current of 200 ma., grid current of 32 to 48 ma., grid resistor of 5000 ohms and frequency of 15 Mc.

● Continuous Commercial Service. → Indicates a change.

●● Intermittent Commercial and Amateur Service.

For ac filament supply.

● Obtained by grid resistor of value shown or by partial self-bias methods.

□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

▲▲ Obtained from fixed supply, by grid resistor (3800,4000) or by cathode resistor (520,560).

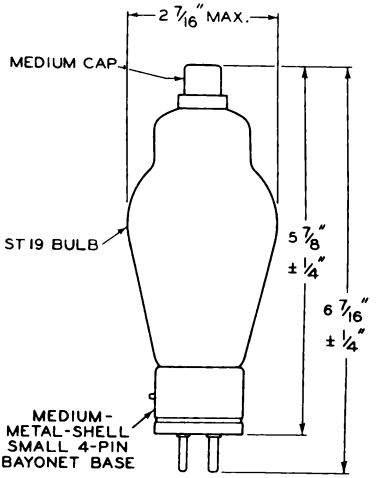
● See next page.

8005
POWER TRIODE

The 8005 can be biased by any convenient method, but the use of a grid resistor is preferred because the bias is automatically varied as the load on the circuit varies. In those applications where grid current and grid voltage may vary widely because of fluctuating loads, it is important to design equipment so that the maximum grid-current and grid-voltage ratings are never exceeded for any load. An approximate rule is to adjust the grid-current and grid-voltage values at full-load to one-half of the corresponding maximum values. This operating condition permits grid-current and grid-voltage values to rise from zero load to twice their full-load values, and usually provides adequate leeway.

NOTE: When the 8005 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed-bias must be used to maintain the plate current at a safe value. With a plate voltage of 1500 volts, a fixed bias of at least -50 volts should be used.

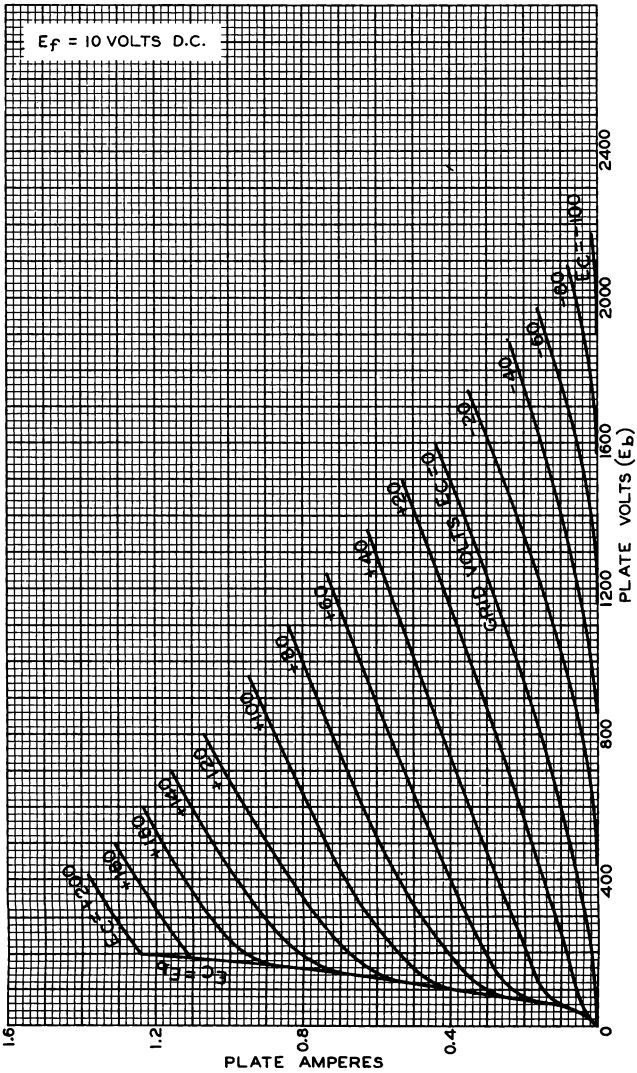
Data on operating frequencies for the 8005 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.



92CM-6283R2

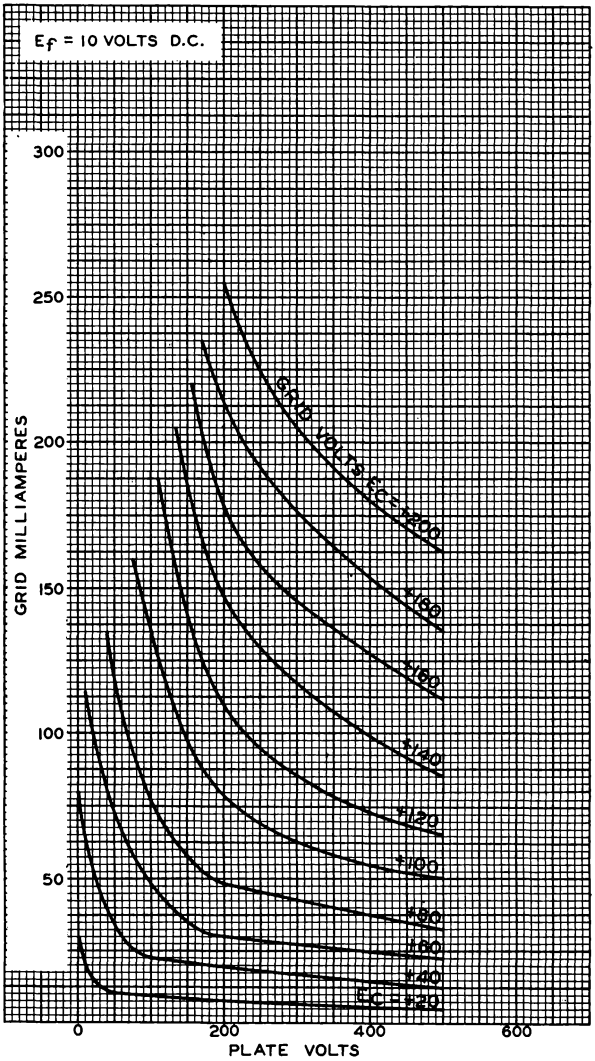
8005

AVERAGE PLATE CHARACTERISTICS



8005

TYPICAL CHARACTERISTICS

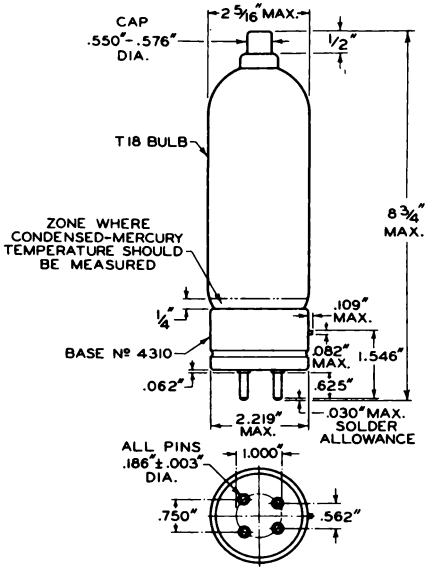


8008

HALF-WAVE MERCURY-VAPOR RECTIFIER

The Type 8008 has the same maximum ratings and operating conditions as Type 872-A/872, but its physical dimensions and base are different.

RCA Socket — Stock No. 9917



BOTTOM VIEW OF BASE

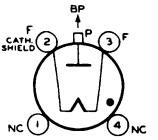
92C-6299

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

BOTTOM VIEW OF
SOCKET CONNECTIONS

Pin 1 - No Connection
Pin 2 - Filament, Cathode Shield
Pin 3 - Filament
Pin 4 - No Connection
Cap - Plate
● - Gas Type Tube



8012-A

U-H-F TRANSMITTING TRIODE

The 8012-A supersedes the Type 8012.

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:**		
Voltage	6.3	ac or dc volts
Current	1.92	amp.
Amplification Factor	18	
Direct Interelectrode Capacitances:		
Grid to Plate	2.5	μμf
Grid to Filament	2.7	μμf
Plate to Filament	0.4	μμf

Mechanical:

Mounting Position . . . . . Vertical Only

Cooling – *Forced-Air Cooling* is required when plate dissipation exceeds 75% of the rated value.

Maximum Overall Length (Excluding Flexible Leads) . . 3-15/16"

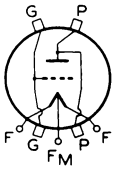
Greatest Radius . . . . . 1-1/8" ± 1/16"

Bulb T-8

Terminal Connections . . . . . *See Outline Drawing*

F – Filament
F_M – Filament Mid-Tap

G – Grid
P – Plate



G TERMINALS NEARER FILAMENT LEADS
P TERMINALS NEARER BULB TIP

GRID-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*	CCS■	
D-C PLATE VOLTAGE	1000 max.	volts
D-C GRID VOLTAGE	-200 max.	volts
D-C PLATE CURRENT	65 max.	ma.
PLATE INPUT	50 max.	watts
PLATE DISSIPATION	40 max.	watts

Typical Operation:

D-C Plate Voltage	1000	volts
D-C Grid Voltage □	-135	volts
	2500	ohms
Peak R-F Grid Voltage	155	volts
Peak A-F Grid Voltage	65	volts
D-C Plate Current	50	ma.
D-C Grid Current *	4 approx.	ma.
Driving Power *▲	3.5 approx.	watts
Power Output	20 approx.	watts

□, ▲: See next page. ■, *, **: See end of tabulation.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

8012-A

U-H-F TRANSMITTING TRIODE

(continued from preceding page)

□ Obtained from fixed supply or by cathode resistor of value shown.
▲ At crest of audio-frequency cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***	CCS■	
D-C PLATE VOLTAGE	800 max.	volts
D-C GRID VOLTAGE	-200 max.	volts
D-C PLATE CURRENT	65 max.	ma.
D-C GRID CURRENT	20 max.	ma.
PLATE INPUT	33 max.	watts
PLATE DISSIPATION	27 max.	watts

Typical Operation:

D-C Plate Voltage	800	volts
D-C Grid Voltage ‡	-105	volts
	10000	ohms
Peak R-F Grid Voltage	145	volts
D-C Plate Current	40	ma.
D-C Grid Current*	10.5 approx.	ma.
Driving Power*	1.4 approx.	watts
Power Output	22 approx.	watts

‡ Obtained preferably from grid resistor of value shown, or combination of grid resistor with either fixed supply or suitably by-passed cathode resistor.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

Maximum Ratings, ***Absolute Values:***	CCS■	
D-C PLATE VOLTAGE	1000 max.	volts
D-C GRID VOLTAGE	-200 max.	volts
D-C PLATE CURRENT	80 max.	ma.
D-C GRID CURRENT	20 max.	ma.
PLATE INPUT	50 max.	watts
PLATE DISSIPATION	40 max.	watts

Typical Operation:

D-C Plate Voltage	1000	volts
D-C Grid Voltage ○	-90	volts
	6400	ohms
	1400	ohms
Peak R-F Grid Voltage	130	volts
D-C Plate Current	50	ma.
D-C Grid Current *	14 approx.	ma.
Driving Power *	1.6 approx.	watts
Power Output	35 approx.	watts

#, ○, *: See next page.
■ CCS = Continuous Commercial Service.

8012-A

U-H-F TRANSMITTING TRIODE

(continued from preceding page)

o Obtained from fixed supply, or grid resistor (6400), or by cathode resistor (1400). When the 8012-A is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With plate voltage of 1000 volts a fixed bias of at least -40 volts should be used.

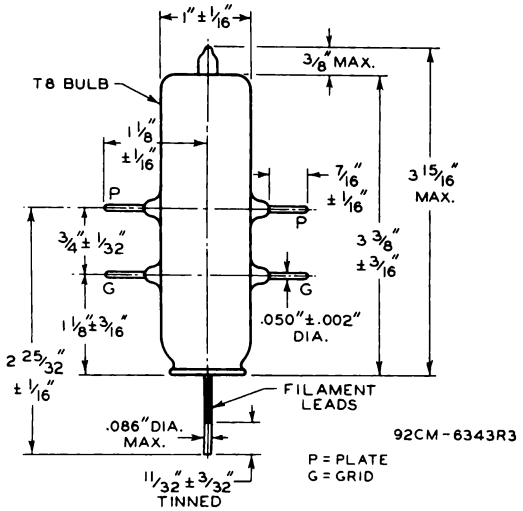
** The filament is center-tapped and the center lead is brought out of the tube. With this design, it is possible to minimize the effect of filament lead inductance by connecting all three filament leads in parallel through r-f by-pass capacitors. The center-lead of this parallel connection should not be returned directly to the center-tap of the filament-transformer winding or to ground, although it may be by-passed to either of these points if desired.

* Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

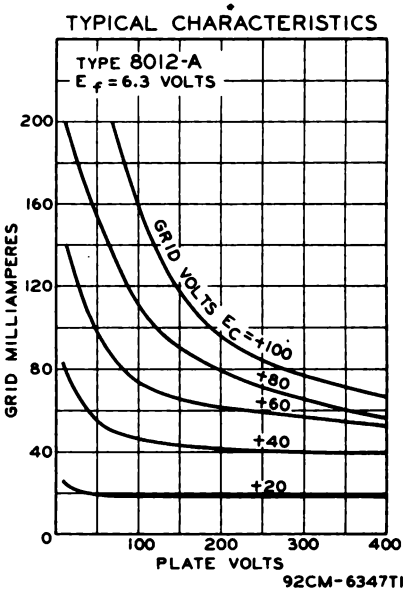
The 8012-A may be operated with maximum ratings at frequencies up to 500 megacycles but as the frequency is raised, the efficiency and power output fall off. At 600 megacycles an efficiency of about 35% can be expected. Since the efficiency at 600 megacycles is relatively low, the plate of the 8012-A has been designed to have an unusually high dissipation rating.

Data on operating frequencies for the 8012-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.



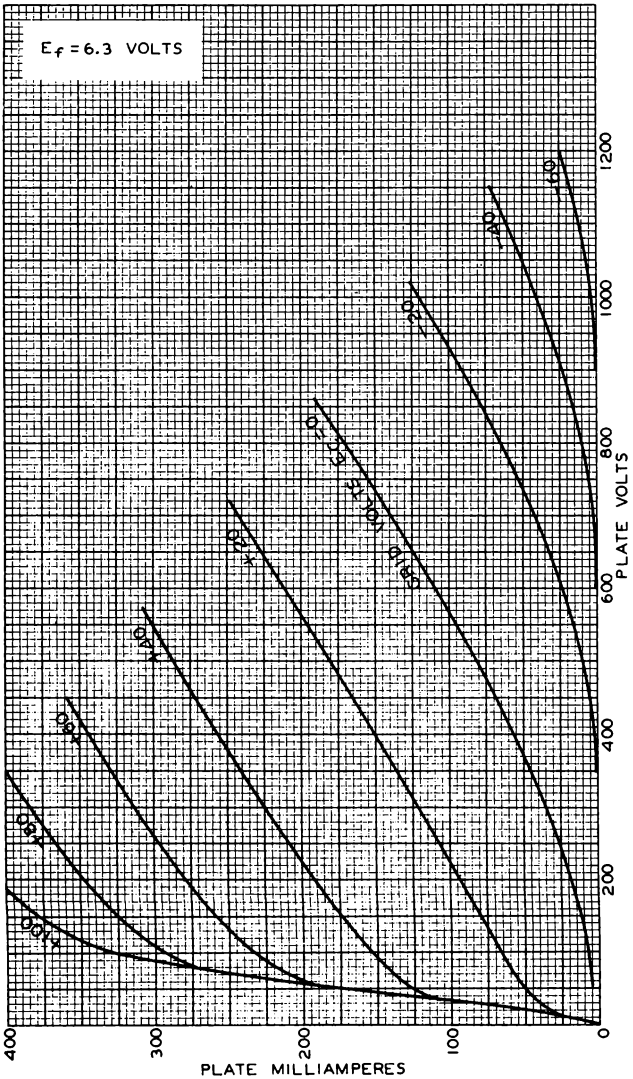
8012-A

U-H-F TRANSMITTING TRIODE



8012-A

AVERAGE PLATE CHARACTERISTICS



DEC. 1, 1943

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6346

8014-A

8014-A

TRANSMITTING TRIODE

FORCED-AIR COOLED

Intended especially for pulsed operation

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:

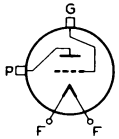
Voltage	15.0	ac volts
Current	14.5	amp
Starting Current:	The filament current must never exceed, even momentarily, a value of 30 amperes	
Peak Filament Emission	50 (approx.)	amp
Amplification Factor	30	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	4.4	μμf
Grid to Filament	4.6	μμf
Plate to Filament	3.2	μμf

Mechanical:

Terminal Connections:

F – Filament

G – Grid Cap Terminal



P – Plate Terminal (Air-Cooled Radiator)

Mounting Position	Vertical only, Filament or Grid End Up
Overall Length	8-17/32" ± 3/16"
Diameter	1-7/8" ± 1/32"
Radiator	Integral Part of Tube

Cooling: Air should be delivered in sufficient quantity to the radiator to limit the temperature of the radiator to the rated maximum value. In addition, a small amount of cooling air is required on the filament. Air-flow must start before the application of any voltages.

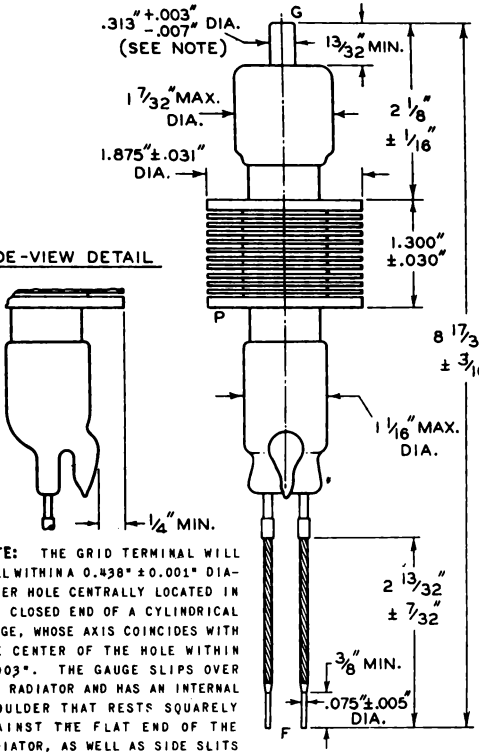
Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE#	13500 max.	volts
DC GRID VOLTAGE	-3000 max.	volts
PLATE DISSIPATION	400 max.	watts
RADIATOR TEMPERATURE▲	180 max.	°C

The maximum value of filter capacitor permitted directly at the tube and its rf circuit is 1.0 μf. A series resistance of at least 15000 ohms must be used between this capacitor and the high-voltage supply.

▲ Measured outside of air blast on outer fin of radiator near plate.

8014-A
TRANSMITTING TRIODE



NOTE: THE GRID TERMINAL WILL FALL WITHIN A 0.438" ± 0.001" DIAMETER HOLE CENTRALLY LOCATED IN THE CLOSED END OF A CYLINDRICAL GAUGE, WHOSE AXIS COINCIDES WITH THE CENTER OF THE HOLE WITHIN 0.003". THE GAUGE SLIPS OVER THE RADIATOR AND HAS AN INTERNAL SHOULDER THAT RESTS SQUARELY AGAINST THE FLAT END OF THE RADIATOR, AS WELL AS SIDE SLITS EXTENDING APPROXIMATELY 1/2" ABOVE THE INTERNAL SHOULDER TO INSURE SPRING FIT OVER THE RADIATOR. THE INNER SURFACE OF THE CLOSED END OF THE GAUGE IS 1.812" + 0.010" - 0.000" FROM THE SHOULDER SURFACE WHICH RESTS AGAINST THE FLAT END OF THE RADIATOR. THE CLOSED END OF THE GAUGE IS 0.438" ± 0.010" THICK.

92CM-6363R1

- 8025-A

U-H-F TRANSMITTING TRIODE

The 8025-A supersedes the Type 8025.

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:**		
Voltage	6.3	ac or dc volts
Current	1.92	amp.
Amplification Factor	18	
Direct Interelectrode Capacitances:		
Grid to Plate	3.0	μμf
Grid to Filament	2.7	μμf
Plate to Filament	0.4	μμf

Mechanical:

Mounting Position . . . . . Vertical Only: Base up or down

Cooling—Requirements are indicated under MAXIMUM RATINGS for each class of service. *Natural Cooling* means that adequate free circulation of air around the tube is necessary. When *Forced-Air Cooling* is required, an air flow from a fan should be directed on the bulb.

Maximum Overall Length . . . . . 4-15/16"

Maximum Seated Length . . . . . 4-5/16"

Greatest Radius . . . . . 1-1/64" ± 1/16"

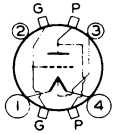
Bulb T-8

Caps (Four) . . . . . Saddle Skirted Miniature, with Nub

Base . . . . . Small 4-Pin, Micanol

Basing Designation for BOTTOM VIEW 3M

Pin 1 - Filament
Pin 2 - No Con.
Pin 3 - Filament Mid-Tap



Pin 4 - Filament
G - Grid
P - Plate

G CAPS NEARER BASE
P CAPS NEARER BULB TIP

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, ***Absolute Values:***

	Forced-Air Cooling CCS▲	*Natural Cooling ICAS*▲	
D-C PLATE VOLTAGE	1000 max.	1000 max.	volts
D-C GRID VOLTAGE	-200 max.	-200 max.	volts
D-C PLATE CURRENT	65 max.	65 max.	ma.
PLATE INPUT	60 max.	50 max.	watts
PLATE DISSIPATION	40 max.	30 max.	watts

Typical Operation:

D-C Plate Voltage	1000	volts
D-C Grid Voltage □	-135	volts
	2500	ohms

□: See next page. ▲,**: See end of tabulation.

8025-A

U-H-F TRANSMITTING TRIODE

(continued from preceding page)

Peak R-F Grid Voltage	155	volts
Peak A-F Grid Voltage	65	volts
D-C Plate Current	50	ma.
D-C Grid Current*	4 approx.	ma.
Driving Power ■ *	3.5 approx.	watts
Power Output	20 approx.	watts

□ Obtained from fixed supply or by cathode resistor of value shown.
■ At crest of audio-frequency cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	Forced-Air Cooling CCS▲	*Natural Cooling ICAS*▲	
D-C PLATE VOLTAGE	800 max.	800 max.	volts
D-C GRID VOLTAGE	-200 max.	-200 max.	volts
D-C PLATE CURRENT	65 max.	65 max.	ma.
D-C GRID CURRENT	20 max.	20 max.	ma.
PLATE INPUT	50 max.	33 max.	watts
PLATE DISSIPATION	27 max.	20 max.	watts

Typical Operation:

D-C Plate Voltage	800	volts
D-C Grid Voltage ‡	-105	volts
	10000	ohms
Peak R-F Grid Voltage	145	volts
D-C Plate Current	40	ma.
D-C Grid Current*	10.5 approx.	ma.
Driving Power*	1.4 approx.	watts
Power Output	22 approx.	watts

‡ Obtained preferably from grid resistor of value shown, or combination of grid resistor with either fixed supply or suitably by-passed cathode resistor.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

Maximum Ratings, *Absolute Values*:

	Forced-Air Cooling CCS▲	*Natural Cooling ICAS*▲	
D-C PLATE VOLTAGE	1000 max.	1000 max.	volts
D-C GRID VOLTAGE	-200 max.	-200 max.	volts
D-C PLATE CURRENT	80 max.	80 max.	ma.
D-C GRID CURRENT	20 max.	20 max.	ma.
PLATE INPUT	75 max.	50 max.	watts
PLATE DISSIPATION	40 max.	30 max.	watts

#, ▲, *; See end of tabulation.

8025-A

U-H-F TRANSMITTING TRIODE

(continued from preceding page)

Typical Operation:

D-C Plate Voltage	1000	volts
D-C Grid Voltage °	-90	volts
	6400	ohms
	1400	ohms
Peak R-F Grid Voltage	130	volts
D-C Plate Current	50	ma.
D-C Grid Current*	14 approx.	ma.
Driving Power *	1.6 approx.	watts
Power Output	35 approx.	watts

** The filament is center-tapped and the center lead is brought out to the No.3 pin. With this design, it is possible to minimize the effect of filament lead inductance by connecting all three filament leads in parallel through r-f by-pass capacitors. The center-lead of this parallel connection should not be returned directly to the center-tap of the filament-transformer winding or to ground, although it may be by-passed to either of these points if desired.

▲ CCS = Continuous Commercial Service; ICAS = Intermittent Commercial and Amateur Service.

* Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

° Obtained from fixed supply, or grid resistor (6400), or by cathode resistor (1400). When the 8025-A is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With plate voltage of 1000 volts a fixed bias of at least - 40 volts should be used.

\# Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

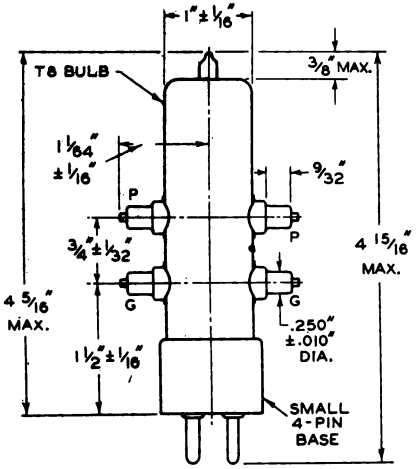
The 8025-A may be operated with maximum ratings at frequencies up to 500 megacycles, but as the frequency is raised, the efficiency and power output fall off. At 600 megacycles an efficiency of about 35% can be expected. Since the efficiency at 600 megacycles is relatively low, the plate of the 8025-A has been designed to have an unusually high dissipation rating.

Data on operating frequencies for the 8025-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

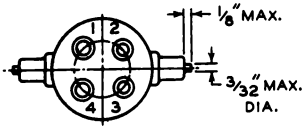
Curves for the 8025-A are the same as those for the 8012-A.

8025-A

U-H-F TRANSMITTING TRIODE



92CM-6394R1



BOTTOM VIEW

℄ OF EACH CAP SHALL NOT DEVIATE MORE THAN 3° FROM PLANE NORMAL TO THE PLANE OF PINS NO. 1 & NO. 4 AND PASSING THROUGH CENTER OF BOTTOM OF BASE.

℄ OF BULB SHALL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE.